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# 2006 Evaluation of 4VWX Herring

Évaluation du hareng dans 4VWX en 2006

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# **ABSTRACT**

Landings in the southwest Nova Scotia/Bay of Fundy spawning component in 2005 of 48,900t were substantially (about 30,000t) lower than the previous year due to the reduced quota. There continues to be signs of deterioration in the state of the stock. Age distribution in the catch remained contracted, with a further decline in the proportion of ages 5+ in the fishery. The truncated catch at age and the rapid decline of individual year-classes indicates that total mortality may be considerably higher than estimated. The benefits of the reduced quota in 2005 have not been in place for a sufficient time to be reflected in the biological characteristics of the population.

The acoustic survey index from the spawning grounds in 2005 indicates a decline in spawning stock biomass (SSB) from 2004. A population model (calibrated with the German Bank acoustic index) indicates that fishing mortality (F) has been very high in recent years and that the current SSB is less than 100,000t. There has also been little progress towards defined conservation objectives in recent years and none are being met. </P><P>

Landings of 5,260t from the 2005 offshore Scotian Shelf banks by purse seine, midwater and bottom trawl were below average since the fishery was reactivated in 1996. The 2005 fishery was dominated by catches of age 4 and 5 fish. The bottom trawl research survey catches, while reduced in 2005, remain high and herring were widely distributed on banks west of Sable Island. </P>

There was an increase in surveyed acoustic biomass in both the Little Hope and Halifax areas after a decline in 2004. A survey with an acoustic recorder was completed for the first time in the Glace Bay area. Recorded landings showed an increase for the Little Hope area and decreases in the other main areas. The Bras d'Or lakes fishery was again closed and there was no sampling from this area.

There was a decrease in landings in the traditional New Brunswick weir and shutoff juvenile herring fishery to 13,000t from 20,700t in 2004 and there is a trend of decreasing landings over the past ten years.

# RÉSUMÉ

En 2005, les débarquements d'adultes reproducteurs dans le sud-ouest de la Nouvelle-Écosse/baie de Fundy se sont chiffrés à 48 900 t, un nombre sensiblement inférieur (environ 30 000 t) à celui enregistré l'année précédente en raison de la réduction du quota. L'état du stock continue de montrer des signes de détérioration. La fourchette d'âges parmi les prises demeure restreinte, un déclin plus prononcé étant observé pour la proportion des harengs des âges 5+ dans la pêche. La répartition tronquée des prises selon l'âge et la baisse rapide des effectifs par classe d'âge révèlent que la mortalité totale pourrait être considérablement plus élevée que prévu. Les avantages de la réduction du quota en 2005 ne sont pas en place depuis suffisamment longtemps pour qu'ils puissent se refléter sur les caractéristiques biologiques de la population.

L'indice des relevés acoustiques réalisés dans les frayères en 2005 indique un déclin de la biomasse du stock de reproducteurs (BSR) par rapport à 2004. Un modèle de population (étalonné d'après l'indice du relevé acoustique sur le banc German) révèle que la mortalité par la pêche a été très élevée ces dernières années et que la BSR actuelle est inférieure à 100 000 t. Au cours des dernières années, il y a eu peu de progrès relativement aux objectifs de conservation établis, et aucun n'a été atteint.

En 2005, les débarqueme. Is de 5 260 t réalisés à l'aide de sennes coulissantes, de chaluts pélagiques et de chaluts de fond au large des bancs du plateau néoécossais ont été inférieurs à la moyenne observée depuis la réouverture de la pêche en 1996. Les prises de 2005 comprenaient principalement des harengs d'âges 4 et 5. Selon les relevés de recherche au chalut de fond, malgré une baisse en 2005, les taux de prises sont demeurés élevés et les harengs étaient très largement répartis sur les bancs à l'ouest de l'île de Sable.

La biomasse recensée dans les relevés acoustiques a augmenté tant dans la région de Little Hope que dans celle d'Halifax, après avoir connu un déclin en 2004. On a effectué un relevé au moyen d'un enregistreur acoustique pour la première fois dans la région de Glace Bay. Les débarquements recensés montrent une augmentation dans la région de Little Hope et des baisses dans les autres principales régions. La pêche dans les lacs Bras d'Or a été fermée de nouveau, et il n'y a pas eu d'échantillonnage dans cette région. </P>

Au Nouveau-Brunswick, les débarquements de la pêche traditionnelle aux harengs juvéniles à la bordigue et au filet-trappe sont passés de 20 700 t (2004) à 13 000 t, et on constate une tendance à la baisse depuis les dix dernières années.

# 2006 Evaluation of 4VWX Herring

#### Introduction

Atlantic herring is a pelagic species found on both sides of the North Atlantic. Herring spawn in discrete locations, to which they are presumed to home. Herring first mature and spawn at three or four years of age (23 to 28 cm or 9 to 11 in), then begin a predictable annual pattern of spawning, overwintering, and summer feeding, which often involves considerable migration and mixing with members of other spawning groups. Most fishing takes place on dense summer feeding, overwintering, and spawning aggregations.

The 4VWX management unit contains a number of spawning areas, separated to various degrees in space and time. Spawning areas in close proximity with similar spawning times, and which share a larval distribution area, are considered part of the same complex. These undoubtedly have much closer affinity than spawning areas that are widely separated in space or time, and do not share a common larval distribution. Some spawning areas are large and offshore, whereas others are small and more localized, sometimes very near shore or in small embayments. The situation is complicated further as herring migrate long distances and mix outside of the spawning period both with members considered part of the same complex and with members of other spawning groups. For the purposes of evaluation and management, the 4VWX herring fisheries are divided into four components (Figure 1):

- 1. SW Nova Scotia/Bay of Fundy spawning component
- 2. Offshore Scotian Shelf banks spawning component
- 3. Coastal (South Shore, Eastern Shore and Cape Breton) Nova Scotia spawning component; and
- 4. SW New Brunswick migrant juveniles.

Each component has several spawning areas, and there is mixing of fish among spawning components. Industry and management have explored means of managing the complexity within each component (such as distributing fishing effort among spawning areas according to their relative size) and of taking appropriate account of interaction among components (such as fishing restrictions on some areas of mixing).

Fisheries in the 4VWX area in recent years have been dominated by purse seine, weir and gillnet, with relatively minor landings by shutoff, trap and midwater trawl (Table 1, 2, 3).

Since 1995, the herring stock assessment and related research has been enhanced by a number of projects undertaken with the assistance of the fishing industry. These include industry sampling of biological characteristics of the catch, acoustic surveys using industry vessels and tagging.

The Georges Bank spawning component is not included in this evaluation except to document Canadian fishing activity from that area (Table 1). There were no herring landings in 2005 from the Canadian portion of Georges Bank. This fishery is included in the Gulf of Maine stock complex and has been recently evaluated separately (DFO 2003a, TRAC 2006).

#### 1) Objectives and Management

The 2003-2006 Scotia-Fundy Herring Integrated Fisheries Management Plan (DFO 2003b) sets out principles, conditions, and management measures for the 4VWX herring fisheries. The main principle stated in the plan is "the conservation of the herring resource and the preservation of all of its spawning components".

Three conservation objectives developed and reviewed by Sinclair (1997) appear in the plan:

- To maintain the reproductive capacity of herring in each management unit through:
- persistence of all spawning components in the management unit;

- maintenance of biomass of each spawning component above a minimum threshold:
- · maintenance of a broad age composition for each spawning component; and
- maintenance of a long spawning period for each spawning component.
- To prevent growth overfishing:
- continue to strive for fishing mortality at or below F0.1
- To maintain ecosystem integrity/ ecological relationships ("ecosystem balance").
- maintain spatial and temporal diversity of spawning
- maintain herring biomass at moderate to high levels

There is evidence that most of these objectives are not being met despite the efforts that have been made in recent years. There is also a need to better define these objectives in terms of minimum thresholds and to explicitly list the spawning components in terms of spatial and temporal expectations.

An "in-season" management process, first implemented in the southwest Nova Scotia fishery during 1995, continued to be used widely within the 4VWX management area (DFO 1997, Stephenson et al. 1996, 1999a). The approach encouraged surveying using the commercial fleet under scientific direction prior to fishing ("survey, assess, then fish" protocol) to ensure that effort was distributed appropriately among various components of the stock (particularly among spawning components) according to the relative size and current state of each component. The use of this approach in recent years has improved data collection and enabled modifications to management decisions to be made with the involvement of participants and on the basis of up-to-date information.

Collaborative research efforts with the fishing industry have been important in recent years. A major portion of the herring industry (including the purse seine sector and major processors) forms the Herring Science Council (HSC), and some members of the fixed gear sector have undertaken a separate Joint Project Agreement with DFO to undertake collaborative scientific projects. The herring industry has continued to provide biological sampling and samples while the purse seine and gillnet sectors undertook key acoustic surveys. Under the auspices of the HSC a dedicated field biologist also takes part in initiatives such as tagging, a summary of fleet activities and analysis of acoustic records from fishing trips.

# 2) SW NOVA SCOTIA/BAY OF FUNDY SPAWNING COMPONENT

# 2.1 The Fishery

Herring fishing locations, NAFO unit areas used for catch and sample aggregation, and fishing areas defined by groupings of 10 mile squares (i.e. 10 minute boxes of latitude and longitude) are shown in Figures 2 to 5.

The 2005 catch limit for this component was 50,000t, a further decrease of 33,000t from the previous year (Table 3, Figure 6). Eighty percent of the catch limit was initially allocated to the mobile gear sector and 20% to the fixed gear sector, as has been done historically. Transfer of quota to the mobile fleet occurred late in the season. Most of the catch over the history of this fishery has come from the summer purse seine fishery gear component (Figure 7).

Total landings from this component in 2005 (48,900t) were 29,100t lower than the previous year, and the lowest on record since 1963 (Table 3). Decreased landings by the purse seine sector accounted for most of the decline, with minimal landings by the gillnet sector (566t) and the Nova Scotia weirs (2,245t).

The temporal and spatial distribution of the purse seine fishery was similar to that of the recent decade (average of 1994-2005) for all areas (Table 4-5). The largest purse seine fisheries occurred on German Bank, on summer feeding fish off Long Island, N.S., in the Scots Bay area and around Grand Manan (Figure 5, 8). There was a substantial decrease in the 2005 landings for Scots Bay to 6,240t from the high

of 24,900t recorded for this area in 2004. The German Bank area made up about 30% of the catch for this component with landings of about 14,000t.

During the 1970's and 1980's, a large fishery took place on over-wintering aggregations in Chedabucto Bay. In recent years however, there has been no fishing effort in this area as traditional vessels have been successfully fishing elsewhere. In some years there has been a small fishery on over-wintering herring in January off Halifax Harbor (Chebucto Head), but the majority of the fall and winter herring landings for the past several years have come from the New Brunswick side of the Bay of Fundy and take place from Oct. to Feb. In the 2004-2005 quota year there were 2,030t taken in Oct. and Nov. of 2004 (Table 1, Figure 9).

The summer purse seine fishery took place in the same areas as in previous years (Figure 10). A large part of this fishery was directed on the major spawning grounds in Scots Bay and on German Bank (Figure 11, 12) where recent catches are primarily within the pre-defined acoustic survey catch areas (Melvin and Power 1999). The Trinity Ledge spawning ground, which is still recovering, is closed to purse seine gear from Aug. 15 to Sept. 15 but there were acoustic surveys followed by some catch (443t) by drift gillnet gear (Figure 13). There was only a small drift gillnet fishery of 120t in the Spectacle Buoy area in 2005. This small fishery of <500t has occurred only sporadically in recent years during the month of June. Outside of this component additional catches by drift gillnet gear occurred in Sept. to Oct. in the Little Hope/Port Mouton spawning grounds. There were also set gillnet catches along the Eastern Shore to the east of Halifax and near Glace Bay in Cape Breton (Figure 13).

Catches in the Nova Scotia weirs of 2,245t were higher than the recent lows of 2000 and 2003 but reduced by about 900t from 2004 (Table 3; Figure 14). The annual variation has been attributed to problems in availability of fish to this fixed stationary gear as there continues to be substantial catches by purse seine in the nearby Long Island area on the Bay of Fundy side of Digby Neck. The seasonal timing of the Nova Scotia weir landings has shifted in the last 4 years with a higher proportion of landings now as late as Aug. and Sept. as compared with the traditional early fishery seen in May and June previously (Table 6). Catches in recent years for the Nova Scotia weirs have been highly variable and not as consistent in their amount or timing as in the previous decade. There has been a decline in the total number of herring weirs but the catch per weir (t) for the Nova Scotia weir fishery has remained near average (Table 7).

# Catch and Effort

Catch and effort which were examined for gillnet data in the previous assessment showed little trend and are considered unrepresentative due to the very small amount of effort (Power et al., 2004). This trend in reduced catch and effort continued in the 2004 fishing season and so this data was not reexamined.

Purse seine landings make up most of the overall catch and are allocated 80% of the TAC in the SW Nova Scotia/Bay of Fundy component under the current management plan. The purse seine catch has fluctuated between 60,000t and 100,000t since 1989 reflecting changes in the TAC (Table 8, Figure 15). The overall number of boats fishing and days fished has been dropping since 1990 due to fleet rationalization. This has resulted in increases in catch per boat and catch per day in recent years. In general, purse seine catch rates are not considered to reflect trends in population abundance due to the nature of herring schooling behavior, the acoustic technology to find these schools with catch rates remaining high or stable at all stock levels.

#### 2.2 Resource Status

#### **Acoustic Surveys**

Automated acoustic recording systems deployed on commercial fishing vessels were used to document the distribution and abundance of Atlantic herring in NAFO Division 4VWX through industry vessel surveys and fishing excursions (Melvin and Power 1999). Regularly scheduled surveys, at approximately

2-week intervals, were conducted on the main spawning components and the spawning stock biomass for each component was estimated by summing these results (Power et al. 2005a, 2006).

In 2005, three surveys were conducted in Scots Bay and three on German Bank, a reduction of one survey from each location in the previous years. Individual survey area coverage was good and consistent with established protocols. Additional acoustic data from fishing nights in Scots Bay and German Bank were examined. At the data input meeting, industry expressed concern about the overall Scots Bay biomass index estimate due to the lateness of the initial survey, time intervals between surveys, the presence of spent fish in catches just prior to the first acoustic survey, and the possibility that some fish may have also come onto the grounds and left between surveys. The spawning fishery period in Scots Bay was reduced from 2004. The duration of the spawning fishery on German Bank was similar to the previous year but began later in August since 2003. No structured surveys occurred on German Bank after October 4.

The documented amount of spawning fish on Trinity Ledge was lower than in the past three years but survey coverage was limited. There were no surveys and no reports of spawning herring on Lurcher Shoal or Seal Island spawning grounds.

The biomass index estimated from acoustic surveys was approximately 233,000t and represents a substantial decline in all areas from recent years (Table 9, Figure 15).

Between 1999 and 2003 acoustic survey results were used as minimum estimates of absolute SSB abundance and the population was considered to be approximately 500,000t. An SSB of that size since the late 1990s would have been expected to result in substantial growth of the population, improved age composition and low fishing mortality, given reasonable recruitment and the landings over that period. The expected growth in the population was not observed in the surveys and increase in proportion of older fish was not observed in either the surveys or the fisheries, and it was noted that the declining proportion of older fish in the population suggested that the total mortality on this stock is high.

The documented amount of spawning fish on Trinity Ledge was again lower but survey coverage was limited. There were no surveys and no reports of spawning herring on the Lurcher or Seal Island spawning grounds.

# Spawning ground turnover rates

The current acoustic survey method on spawning grounds is dependent on periodic turnover of spawning fish on the grounds. Acoustic surveys are required to be separated by at least 10 to 14 days to allow for turnover and to prevent double counting (Power et al. 2002). This aspect of the assessment method was the subject of investigation in 2001 and of intensive sampling for maturity stage since the 2002 fishing season. The results are summarized by Melvin et al. (2003, 2004, Power et al. 2005a) and were used to assist in the evaluation of turnover timing and the inclusion or exclusion of specific acoustic surveys.

From 1998 to 2002, the Pelagics Research Council/Herring Science Council, in partnership with Fisheries and Oceans Canada, tagged herring on spawning grounds and on the major Nova Scotia overwintering grounds. Although this project has concluded, tags continue to be returned. The information on tags returned from this study has been summarized by Waters and Clark (2005).

In response to a recommendation from the 2005 RAP, tags were applied to herring on the spawning grounds of Scots Bay and German Bank (Clark, 2006). The results from the tag returns indicated that some tagged herring remained on the spawning grounds for at least 3 weeks after tagging, and in some cases, up to five to six weeks after tagging. As a result, acoustic surveys that were spaced at 2 week intervals were surveying some of the same fish twice. These results also indicated a possible affinity between the fish tagged in Scots Bay and the New Brunswick weirs.

## **Exploitation Rates on Spawning Grounds**

The acoustic survey estimates and catches from individual spawning areas were examined in an attempt to estimate partial exploitation rates for spatially and temporally different spawning groups. This is useful information for assessing the impact of fishing and the relative size of individual spawning units as well as for the overall stock component (Table 10). For this analysis only the three major spawning components (i.e. Scots Bay, German Bank, Trinity Ledge) that have received consistent survey effort were included. Since there are also questions about comparability of acoustic surveys, in terms of the area of survey coverage among years, only data since 1997 are shown and only data since 1999 are included in the overall averages (Table 10-A1). Catches throughout the year from the spawning grounds were assumed to be site specific (Table 10-C1), while catches from all other areas were considered non-spawning and were allocated based on the relative spawning ground SSB proportions (Table 10-A2, C2). In addition the SSB for Seal Island and Spectacle Buoy were allocated to the German Bank spawning area. The exploitation rates were calculated for both the actual catch on the spawning grounds and the overall adjusted catch as Catch / SSB (Table10-P1, P2).

Calculation of exploitation rates by component since 1999 (Table 10, P2) showed that the larger grounds (German Bank and Scots Bay) have an overall exploitation of 14 to 49% for individual areas and years while Trinity Ledge had more variable levels (from 16 to 146%) which may be a problem of catch allocation as well as inconsistent survey effort over the period. The overall exploitation rate for the 4WX stock ranged between 14 and 21%, which are close to the target of F0.1 = 0.22 (exploitation of 18%). These rates are dependent on the assumptions that the acoustic survey SSB is complete and that catches have been properly allocated.

## Fleet Activity

A summary of daily fishery information compiled by the Herring Science Council and DFO confirmed that the fishery on the SW Nova Scotia/Bay of Fundy component was largely as expected in location and timing, and that there were substantial amounts of herring in some areas other than spawning grounds (Appendix A). In recent years there has been an increase in market for juvenile herring for both lobster bait and to offset a shortfall in weir landings which has been a traditional source of juveniles.

#### Sampling

Comprehensive biological sampling continued with substantial involvement of the fishing industry. In 2005 a total of 1,240 samples comprising 135,160 fish were measured for length while 5,825 fish were sampled for age. The distribution of samples by gear and month is presented in Table 11. The sources of samples are shown in Table 12 with the bulk of samples coming from the processing industry, has been the case since 1996. Additional samples were collected by: DFO personnel, observers deployed on purse seine vessels and from DFO research surveys. Sampling from the commercial fishery was well matched to the spatial and temporal distribution of the fishery. Additional sampling from research vessel surveys during the spring and summer resulted in widespread geographic coverage as in the past (Figure 16).

#### Age reading consistency tests

Age reading consistency tests are done in order to evaluate the accuracy and precision of age reading. In 2005 a sub-sample of 143 otoliths were selected from the 2005 collection for the purpose of a within-reader test. There was good representation of the months, areas and gear types sampled during the year. Otoliths were read and then compared to a previous reading. The results show a 93% agreement between the two readings (Table 13). The sum of differences is -2 and the mean coefficient of variation was calculated to be 1.45% (Figure 17).

#### Catch at Age

Consistent with previous assessments, the catch at age was constructed using the MFD 'Catch at Age' application (version 10.4) which is a Marine Fish Division windows based program for computing catch at

age statistics as part of the stock assessment process. Data files used by 'Catch at Age' were created with the 'CATCHFRM' application that was used to select fish sample data from the Pelagic Samples Database. These data included a 2% adjustment for the shrinkage due to freezing on the length measurements for frozen samples (Hunt et al. 1986). The length-weight relationships, which are also required as input to the 'Catch at Age' application, were calculated using an Oracle SQL\*Plus script. The catch at age statistics were then calculated from length frequency and age-length key samples expanded to total catch using appropriate monthly length-weight relationships. The data were grouped or combined and then age-length keys were applied to length frequencies to produce catch at age statistics by NAFO unit area, gear-type and month.

# Age Composition of the Catch

Under F<sub>0.1</sub> fishing and constant average recruitment, the age composition of the population caught in the fishery would be expected to be similar to that shown in Figure 18. There would be peak abundance at age 4, substantial fish surviving older than age 6 and a buildup of fish at ages 11+. This expected or ideal age structure has been used in recent assessments for comparison with the actual catch at age which has been characterized by a predominance of younger ages 2-3 and few fish older than six years old (Stephenson et al. 1999b, 2001, Power et al. 2005b).

The 2001 year-class (at age 4) represented about 40% of the numbers and 52% of the weight of herring landed in the SW Nova Scotia / Bay of Fundy component (Figure 19). The 2002 year-class (at age 3) represented 37% of the numbers and 29% of the weight in the landings. These two year classes were also seen in similar relative proportions in the previous year's fishery and were close to the levels projected by the VPA formulation used in the last assessment.

Age 4 fish were predominant by weight across all gear components except the 4Xs winter purse seine fishery (Jan.-Feb. 2005) which landed mostly age 2 fish (Table 14, Figure 20). The catch at age was also broken down by unit area, month and fishing ground for the purse seine sector which made up the majority of the overall catch (Table 15,16,17; Figure 21-23). Once again, ages 3 and 4 predominated in most areas and months, except for Long Island (area 4Xr) off southwest Nova Scotia where age 2 was the highest by numbers (Figure 23).

The historical time series of catch at age was extended to include the current fishing year and is shown as total number caught as well as percent by age (Table 18-19). The series shows very few fish older than age 7 in recent years and has been dominated by ages 2 through 4 since 1998 (Figure 24, 25). The series is now primarily made up of fish age 6 and younger but older ages were a feature when strong year-classes (i.e. 1976 and 1983) were progressing through the fishery. Age distribution in the catch remained contracted, with a further decline in the proportion of ages 5+ in the fishery (Figure 26). Age 7+ has shown a declining trend since 1990 corresponding to the demise of the 1983 year-class, which was the last very strong year-class in this component. There was an increase in the percentage of age 4's in the catch in 2005 with the influx of the 2001 year class (Figure 26). The rapid decline of year-classes (including the strong 1998 year-class) implies a high total mortality.

Prior to 2005, there was targeting of young fish and the high proportion of juveniles in the catch resulted in reduced yield. As a result of the concern that 2 year olds were being targeted, industry attempted to redirect to older fish. In 2005, 2 year olds represented only 16% of the catch, a reduction from 36% (Table 19). The total removals of fish by numbers were also reduced by close to 50%.

The trend toward catches at younger ages results in reduced yield and is reflected as an decrease in the average weight of fish in the overall catch at age (Figure 27). This indicator has declined from an average fish weight of 160 to 180g in the 1980's and 1990's to about 100g fish in the current year. These levels have not been observed since 1975, which was just prior to the closure of the meal fishery, the implementation of individual boat quotas and the conversion to a food fishery by the industry (Iles 1993). There is cause for concern for a recruitment fishery on younger ages when there is a lack of knowledge on the size of the incoming year-classes.

## Weight at Age

The average weights at age showed inconsistent trends by age in the most recent five years with ages 1 to 4 declining, ages 5 to 8 increasing, and ages 9 and 10 both up and down (Table 20 and Figure 28), but were within the range of data observed historically (Power and Iles 2001). The most recent 5 year and 10 year average weights at age are consistently lighter than the overall series average (Figure 29) and reflect a general decline in weight at age that occurred for all ages in the mid 1980's.

#### **VPA** Analysis

A population model (Virtual Population Analysis, VPA) was fitted to this stock component. The previous assessment (Power et al. 2005b) concluded that the SSB from acoustic surveys summed together results in an overestimate but that as an index of abundance, acoustic surveys follow the biomass trend from the population model. While the discrepancy between the acoustic estimate of absolute SSB abundance and the VPA has not been resolved, there are several potential explanations. A tagging study undertaken in 2005 on both German Bank and Scots Bay confirmed that residence time of a portion of the fish on the spawning grounds may exceed the assumed two week turnover interval. However, adjustments to the acoustic biomass estimates, based on preliminary analysis of the tagging data from Scots Bay, appear to only account for about 40% of the difference between VPA and acoustic estimates. Biomass estimates from single acoustic surveys exceeded total VPA results for the series. The difference is not fully explained by possible double counting by the acoustic surveys, but could also relate to other issues including an inappropriate target strength coefficient for converting backscatter to biomass or unaccounted mortality.

Age specific indices of abundance were constructed from the acoustic survey data using samples appropriate for each survey conducted by area and year for 1999 to 2005 and applying the biomass estimates that were determined (Table 21, Figure 30, 31). These indices were also constructed for the major spawning area, German Bank, separately from the overall (Table 22, Figure 32, 33). These indices were then used as the primary input for tuning or calibration of the VPA. The catch at age from the fishery is also required as input to reconstruct the population history using virtual population analysis (VPA) (Table 18, Figure 25).

Population reconstruction from the catch at age requires some assumptions to be made about conditions in the terminal year. One assumption concerns the exploitation pattern at age (partial recruitment); examination of this pattern since 1990 suggests that an exploitation pattern at age of 0.2, 0.4, 0.7 and 0.9 for ages 2-5 and 1.0 for age 6 and older is a reasonable approximation (Table 23, Figure 34, 35). Other assumptions for the population reconstruction follow traditional approaches from the previous assessment, i.e. M=0.2 and  $F_{10}=$ population weighted average for ages 6-9 and to estimate the 1st fully recruited age at age 7 in the terminal year of 2006.

Calculations of total mortality (Z = Fishing mortality + Natural mortality) were calculated using the acoustic catch at age data. Z calculations are typically quite variable but can often be used to detect broad patterns and for confirmation of VPA results. The Z values were calculated using ages 4 to 8 compared with ages 5 to 9 in the following year. The acoustic age composition is assumed to be representative of the overall spawning biomass. The results for 2000 to 2005 have high values of Z between 0.5 and 1.8 (Figure 36). There is no apparent trend as the series is very short; however these values appear consistent with the higher F's estimated from the proportional VPA.

The acoustic survey index from the spawning grounds in 2005 indicates a decline in spawning stock biomass from 2004 (Figure 37). A VPA was calibrated with the trends in acoustic survey results, using fishery catch statistics and sampling for size and age composition of the catch for 1965-2005. Various VPA formulations were investigated and two models were presented for review.

Initial results based on the formulation used in the previous year suggested using only ages 4-8 from the acoustic series since ages 2-3 are considered mostly non-spawning and age 9 and older are so few in number they are poorly estimated (Figure 38-40).

A VPA model using the overall acoustic survey index (Scots Bay, Trinity Ledge, Spectacle Buoy, and German Bank) calibrated with ages 4 to 8 was examined (Appendix A). Diagnostics for the VPA using the overall acoustic survey index include results for the parameters being estimated by the model (Figure 41). The population abundance at age 7 in 2006 was estimated as 1,543 million with a moderately high standard error of 49% and a low bias of 11%. The other parameters estimated were the Q's or catchabilities for ages 4 to 8 which also had moderate SE's of 29% and low bias of 4%. The trend of increasing Q's at age and the lack of the typical dome or flat-top trend at older ages is unusual and may be due to the short time series and lack of older fish in the population (Figure 41). The pattern of residuals is acceptable with a mixture of moderate size positive and negative residuals (Figure 42). However, there is a strong year effect in 2005 with positive residuals for all ages which may be an indication of a potential future retrospective problem. Age by age and overall combined plots of the observed abundance index and predicted population numbers versus year from VPA run with overall acoustic index for ages 4 to 8 showed a generally decreasing trend over the time series for all ages (Figure 43). Age by age plots of the (In) observed and (In) predicted abundance index versus population numbers from a tuned VPA with the overall acoustic index for ages 4 to 8 treated as proportional to population numbers showed reasonable fits for ages 5 to 8 but with some large deviations from the fitted line and with age 2 having a slightly negative relationship of (In) CPUE with (In) population abundance (Figure 44). The model showed a slightly declining SSB and total biomass since 1999 (Table 24, Figure 45, 46) and increasing fishing mortality (ages 5 to 8 weighted by population numbers) with a large drop in the current year reflecting the drop in the TAC (Table 25, Figure 47).

The projection input parameters for exploitation rate, natural mortality, partial recruitment, maturities and weights at age which were used for all runs are shown in Table 26. Projection results and risk analysis are provided in terms of the consequences of various catch quotas (yield) (Figure 48). To have a low to neutral risk of exceeding F=0.2 requires a catch of about 10,000t. Catches as high as 40,000t will have a neutral chance for 0% biomass change. These results are also shown in terms of exploitation rate and expected biomass change for various yields (Figure 49).

A second population model calibrated with the German Bank acoustic index only was selected to overcome uncertainty with survey timing in Scots Bay (Appendix B). Diagnostics for the VPA using the overall acoustic survey index include results for the parameters being estimated by the model (Figure 50). The population abundance at age 7 in 2006 was estimated as 2,808 million with a moderately high standard error of 47% and a low bias of 9% and was slightly lower than the first model. The other parameters estimated were the Q's or catchabilities for ages 4 to 8 which also had moderate SE's of 30% and low bias of 4%. The trend of increasing Q's at age and the lack of the typical dome or flat-top trend at older ages is unusual and may be due to the short time series and lack of older fish in the population (Figure 50). The pattern of residuals is acceptable with a mixture of moderate size positive and negative residuals (Figure 51). Age by age and overall combined plots of the observed abundance index and predicted population numbers versus year from VPA run with overall acoustic index for ages 4 to 8 again showed a generally decreasing trend over the time series for all ages (Figure 52). Age by age plots of the (In) observed and (In) predicted abundance index versus population numbers from a tuned VPA with the overall acoustic index for ages 4 to 8 treated as proportional to population numbers showed reasonable fits for ages 5 to 8 but with some large deviations from the fitted line. The age 2 trend was improved in this formulation having a flat relationship of (In) CPUE with (In) population abundance (Figure 53). The model again showed slightly declining SSB and total biomass since 1999 (Table 27, Figure 54, 55) and increasing fishing mortality (ages 5 to 8 weighted by population numbers) with a large drop in the current year reflecting the drop in the TAC (Table 28, Figure 56).

The VPA calibrated with the German Bank indicates that fishing mortality (F) has been very high in recent years and that the current SSB is less than 100,000t (Table 27, Figure 54). Recruitment at age 1 indicates lower than average recruitment in 2003 and 2004 with the 2003 year-class (age 1 in 2004) being relatively weak (Figure 57). Projection results and risk analysis are provided in terms of the consequences of various catch quotas (yield) (Figure 58). To have a low to neutral risk of exceeding F=0.2 requires a catch of about 16,000t. Status quo catches would result in no expected increase in biomass. These results are also shown in terms of exploitation rate and expected biomass change for various yields

(Figure 59). The reduced quota in 2005 resulted in a lowering of F but it is still high relative to  $F_{0.1}(0.23)$ . The benefits of the reduced quota are reflected in the reduced fishing mortality rate in 2005 but the adjustments have not been in place for a sufficient period to be reflected in the biological characteristics of the population.

Retrospective analysis for the VPA with German Bank acoustic index (ages 4 to 8) with successive years of analysis removed was completed (Figure 60). Results for this analysis of estimation of fishing mortality (F), showed an underestimation of F in recent years but overestimation for some earlier years. Recruitment at age 1 was well estimated for most years going back in time. Beginning of year SSB and beginning of year total biomass estimation was more variable with underestimates in recent years and overestimates in older years. Some of this variability is due to the short length of the survey index and the effect of removing data while doing this analysis.

Fishery catches are considered reasonably reliable and it is not thought that large amounts of unreported catch have occurred in recent years. Age interpretation appears to track strong and weak year-classes historically and there is consistency of age interpretation between and within readers across years.

There is strong support for the interpretation of stock status that the trend in biomass has been flat over recent years and the total biomass is less than half of the acoustic survey estimate. It should be emphasized that the acoustic index only provides information on about 50% of the total biomass with younger ages estimated with average partial recruitment.

This assessment has confirmed a continued deterioration in the state of the resource, as noted in previous assessments. A harvest strategy that allows rapid population rebuilding is strongly recommended. Projection results and risk analysis are provided in terms of the consequences of various catch quotas (yield) (Figure 58). Catches of less than about 16,000t would be required to have a low to neutral probability of exceeding F<sub>0.1</sub>. Catches as high as 35,000t should result in a neutral (50%) probability of a moderate (20%) biomass increase. At status quo (catches of 50,000t) there is a 40% probability that biomass will not increase at all and a high probability (90%) that it will not increase by a moderate (20%) amount.

# 2.3 Sources of Uncertainty

The benefits of the reduced quota in 2005 have not been in place for a sufficient time to be reflected in the biological characteristics of the population. Industry stated that they took action to avoid young fish in 2005 and the fraction of younger fish removed was substantially reduced.

About half of the catch biomass in recent years has been comprised of ages 2 and 3, and the abundance of these recruiting ages is uncertain. The acoustic index provides independent information on the spawning stock biomass but does not provide data on younger age classes. The size of herring year-classes is highly variable. There is no index of recruitment and thus the initial estimate of year-class size can only be derived from the VPA. Younger ages are derived from the VPA and are based primarily on estimates.

## 2.4 Ecosystem Considerations

Herring is prominent in the diet of many fish, seabirds and marine mammals, and should be managed with these interactions in mind. At present, use of a natural mortality rate of 0.2 and maintenance of SSB at moderate to high levels are assumed to account for these interactions.

Recent management initiatives to protect spawning components are intended to maintain the spatial and temporal diversity of herring spawning. Increased fishing on juveniles, which are of mixed or unknown stock affinity, is inconsistent with this objective.

#### 2.5 Outlook

Recent assessments of the SWNS/BOF spawning component suggested that fishing mortality should remain below F0.1 (about 20% exploitation rate) for a number of years in order to rebuild spawning stock biomass in all spawning areas and to expand the age composition so as to meet the explicit biological objectives of management.

The 2005 fishery was about 30,000t less than in the previous year. Acoustic surveys showed a substantial decline in SSB to approximately 230,000t, there continues to be deterioration in the state of the stock and some of the conservation objectives specified for this fishery are not being met. There is an absence of older fish in the population and increased targeting of juveniles. While there is spawning on Trinity Ledge and a small amount of spawning has been observed in recent years near Seal Island, the SSB on both Trinity Ledge and Seal Island spawning areas remain well below historical levels.

The rapid decline in year-classes (failure to reach older ages), even in the strong recent 1998 year-class, indicates high total mortality. It seems that the current catch is substantially higher than what would be consistent with a moderate F. Although these high exploitation rates have not resulted in a reduction of surveyed spawning biomass (presumably due to reasonable recruitment), the rebuilding that these recruits may have represented has been lost.

Recent catches have been mostly consistent with the survey, assess, fish protocol of less than 20% of surveyed biomass. However the catch at age indicates that total mortality may be considerably higher. The increased trend to catch juveniles could compromise SSB, expansion of age composition and reoccupation of spawning grounds.

#### 2.6 Management Considerations

An evaluation of progress in recent years against biological objectives in the management plan (DFO 2003b) indicate that most objectives are not being met (Table 29). The German Bank and Scots Bay spawning components have declining biomass estimates and Trinity Ledge, Lurcher Shoal and Seal Island are at low biomass. There was also a delayed start and shorter duration of spawning in 2005 for both Scots Bay and German Bank with insufficient spawning in some areas. This was reflected in a substantial decline in the acoustic index from 2004. There was a further decline in proportion of older ages and the age composition is very narrow, although targeting of small fish was reduced in 2005. Fishing mortality is high and well above F<sub>0.1</sub> and the SSB is at lowest recorded level.

The in-season management approach, which spreads the effort in the fishery spatially and temporally among spawning components, is seen as beneficial in achieving the conservation objectives. The "survey, assess, then fish" protocol is effective in spreading the catch appropriately among spawning components in proportion to their relative size and is considered an important safeguard.

Acoustic surveys have become critical to stock status evaluation. Surveys conducted in 2005 conformed to the proposed survey design. It is important that there be continued attention to coverage and survey design in order to assure year-to-year consistency in all spawning areas.

## 3) OFFSHORE SCOTIAN SHELF BANKS SPAWNING COMPONENT

# 3.1 The Fishery

A foreign fishery during 1963-1973 is estimated to have removed as much as 60,000t per year from the offshore Scotian Shelf banks (Stephenson et al. 1987). Few herring were caught after the extension of jurisdiction in 1977 until 1996, when a fishery was initiated by the 4WX purse seine fleet and 11,700t was taken (Table 3). Since 1996, a fishery has taken place on feeding aggregations on the offshore banks, primarily in May and June, with catches ranging from 1,000 to 20,000t. The variability in catch levels was often due to problems of fish being too deep, weather and market conditions rather than in the abundance of herring in these areas.

Total landings in 2005 were 5,200t with most landings by purse seine in May and June, in the vicinity of the Patch, Emerald and Western Bank (Figure 61). Landings of the 2005 fishery on the Scotian Shelf Banks were again below the nine year average (approx. 9,000t) (Figure 62). In 2005, herring continued to be caught as by-catch in the domestic bottom trawl fishery on the Scotian Shelf edge and slope with 75t reported (Table 1). There was also effort in the late fall by midwater trawlers with 885t caught in the offshore east of the Patch (Table 1).

The 2000 to 2001 year-classes (ages 5 and 4) made up most of the age composition of the Scotian Shelf fishery in 2005, with age 5 dominating in both number and weight (Table 30, Figure 63, 64).

## 3.2 Research and Industry Surveys

## **Industry Surveys**

Fleet activity/catch in the spring/early summer fishery on the offshore banks of the Scotian Shelf continued to decrease in 2005. Acoustic recorders were activated on a few occasions but insufficient quantities of fish were observed to warrant analysis. Consequently there again were no industry surveys of the area in 2005 and no acoustic biomass estimates were available from the Scotian Shelf (Power et al. 2006).

# Herring Larval Survey

An autumn larval herring survey was completed from 1972 to 1998 for a set of fixed location stations in the Bay of Fundy (Table 31). The survey was ended in 1998 but is again presented here for the record.

# July Bottom Trawl Survey

Previous results from the summer bottom trawl survey showed few herring on the Scotian Shelf during the 1970's, increasing amounts during the 1980's and a relatively widespread distribution in recent years (Harris and Stephenson 1999, Power et al. 2004, Stephenson et al. 2001). Offshore herring catches from this survey showed a substantial decline from the high in the previous year for strata 55 through 78 (Table 32, Figure 65). Inter-vessel conversion factors established for differences in fishing efficiency by species are being developed from the comparative surveys completed in 2005.

Decreasing trends are also similar for the combined strata from each of the areas 4W and 4X (Table 32, Figure 66). The strata areas used for selection of trawling stations in this bottom trawl survey series are shown in Figure 67. Herring were again widely distributed on banks west of Sable Island (Figure 68) and were comparable to average catches from the last nine years (Figure 69).

The survey data for areas 4WX combined (strata 53/95) were analysed by age to produce stratified mean numbers per tow over the series (Table 33). There was a lack of consistency with the large year-classes observed in the fishery and a lack of tracking of these year-classes from year to year. There have been two major changes in the catch rates by bottom trawl over the series; the first with the introduction of the Alfred Needler in 1987 and a second large increase since 1994. The data by age and year shows a lack of older ages in the catch over the past decade and does not appear to track strong year classes consistently (Table 33).

#### Fall Herring Research Survey

There has been no fall herring research survey on the Scotian Shelf since 2002 when the research vessel Alfred Needler was used to explore the various inshore and offshore areas where herring were known to aggregate.

# 3.3 Outlook and Management Considerations

The summer bottom trawl research survey demonstrates that there is a considerable abundance of herring widely spread over the offshore banks of the Scotian Shelf. Information from previous assessments indicated the presence of at least some autumn spawning on Western Bank in recent years. There is very little new information to add and no reason to change the previous outlook:

- Recorded landings in the foreign fisheries of 13,000t to 60,000t between 1969 and 1973 did not appear
  to be sustainable.
- The initial catch allocation for 2005 should not exceed the 12,000t reference value used in the recent fishing plans.

There continues to be insufficient documentation of stock size, distribution and spawning behavior for this component. There have been no industry surveys of the offshore Scotian Shelf area since 2001. Industry, DFO Science and Management are encouraged to continue to work together to improve the biological basis for management. The industry should be encouraged to explore and undertake surveys of the offshore area.

# 4) COASTAL (SOUTH SHORE, EASTERN SHORE AND CAPE BRETON) NOVA SCOTIA SPAWNING COMPONENT

#### 4.1 The Fishery and Resource Status

There is no quota for the coastal Nova Scotia spawning component and, apart from four areas; the size and historical performance of various spawning groups are poorly documented. In addition to the traditional bait and personal-use fisheries, directed roe fisheries have occurred on several spawning grounds in recent years.

In addition to traditional coastal fixed gear fisheries for subsistence and personal bait, there has been an increase in the number of active gillnet licenses in recent years aimed at spawning herring for the roe market (Clark et al. 1999). As the inshore roe fisheries off Glace Bay, East of Halifax and Little Hope have developed, participants have contributed to sampling and surveying and the fisheries have attempted to follow the 'survey, assess, fish' protocol. This was the tenth year for a fishery on spawning fish off Halifax/Eastern Shore and the ninth year of gillnet roe fisheries off Little Hope/Port Mouton and Glace Bay.

The recorded landings (6,300t) in 2005 in the four major gillnet fisheries along the coast of Nova Scotia were lower for the Eastern Shore and Glace Bay areas, but higher for Little Hope/Port Mouton. The Bras d'Or Lakes fishery remained closed (Table 34).

In 2005, there was an increase in surveyed acoustic biomass in both the Little Hope and Halifax areas after a decline in 2004 (Table 35) (Power et al. 2006). A survey with an acoustic recorder was completed for the first time in the Glace Bay area (previous estimates were based on mapping surveys). As indicated for the SW Nova Scotia / Bay of Fundy component, summing of multiple surveys may result in overestimates of SSB due to double counting. However, the majority of surveys of the Coastal Nova Scotia spawning component were undertaken on spatially separated aggregations of fish.

Management of these spawning components using "survey, assess, then fish (<10%)" protocol is considered useful when the components are considered to be healthy and of sufficient size. The history of the application of this protocol has had some mixed success due to some occasional problems in executing surveys.

Exploitation rates for the coastal areas with acoustic survey estimates have been calculated as the proportion of landings against estimated SSB (Table 36).

#### Little Hope

The fishery in the Port Mouton/Little Hope area occurred primarily in October with a total of 2239t of herring landed (Figure 70). Sampling indicated that the catch was composed primarily of the 2000 year-class at age 5 (Table 37, Figure 71).

A total of two acoustic surveys took place on the spawning ground on Oct. 4 and Oct. 19, 2005 (Power et al. 2006). The overall acoustic estimate for this area was 39,500t (22% SE).

# East of Halifax (4W Eastern Shore)

The roe fishery for the Eastern Shore area in September and October landed 3,400t a decrease of about 700t from 2004 (Figure 72). Sampling was limited to the two survey nights that took place and indicated that the catch was composed of large spawning fish mainly of the 1998 - 2000 year-classes (age 5-7) (Figure 73, Table 37).

Acoustic surveys undertaken by the Eastern Shore Fishermen's Protective Association in September and October 2004 estimated an SSB of 28,100t (16% SE) which was about 10,000t higher than the previous year (Table 35) (Power et al. 2006).

#### Glace Bay

The fishery off Glace Bay, Cape Breton took place in October with total landings of 630t, which was a large decrease from the previous year (Figure 74, Table 32). Length samples indicated large herring, mostly over 30 cm in total length while maturity samples taken in September were primarily of spawning fish. Fish aged 7 (1998 year-class) dominated the catch (Figure 75, Table 37).

Acoustic survey information was available for 2005 for the first time and recordings were available from two separate occasions. The overall survey estimate from the limited data was 2,200t (Table 35).

#### Bras d'Or Lakes

The fishery was closed in 2004. No sampling or acoustic surveys were undertaken in the Bras d'Or lakes to document the size distribution or abundance of herring.

## 4.2 Outlook and Management Considerations

Management approaches and recent research efforts have improved knowledge in these three areas (Little Hope/Port Mouton, Halifax/Eastern Shore and Glace Bay), but there has been no increase in knowledge in adjacent areas. Individual spawning groups within this component are considered vulnerable to fishing because of their relatively small size and proximity to shore. As in the past five years, it is recommended that no coastal spawning areas should experience a large effort increase until much more information is available on the state of that spawning group, and there should be no new fisheries developed when there is uncertainty regarding stock composition and degree of mixing.

It has been noted since 1997 that the status of herring in the Bras d'Or Lakes is cause for concern. Spawning is still absent from some traditional areas and the observed biomass of spring spawners is very low. It is therefore appropriate to reiterate from a biological perspective, that no fishing take place on this spawning component.

## 5) SW NEW BRUNSWICK MIGRANT JUVENILES

The southwest New Brunswick weir and shutoff fisheries have relied, for over a century, on the aggregation of large numbers of juvenile herring (ages 1-3) near shore at the mouth of the Bay of Fundy.

These fish have been considered to be a mixture of juveniles, dominated by those originating from NAFO Subarea 5 spawning components, and have therefore been excluded from the 4WX quota.

The number and distribution of active weirs have decreased over the past decade, due in part to the conversion of sites to aquaculture, as well as the reduction in landings over the past decade in the Passamaquoddy Bay area (Table 1, 3, 7). In the 2003 there was a large drop in landings in the traditional New Brunswick weir and shutoff fishery to 9,000t - the lowest since 1983 - and there was concern expressed for this fishery. In 2004 weir landings increased to 20,600t (Table 1, 3, Figure 76, 77), the highest since 1994, while in 2005 landings decreased to 13,055 t. There is a trend of decreasing landings in this fishery in the past decade with catches below the 10 year average for 5 of the last 10 years (Table 3, Figure 78).

The 2005 catch was dominated by the 2003 year-class (age 2) in number and the 2002 year-class (age 4) by weight. Mature herring (ages 4+) taken in this fishery are considered to be of 4WX origin (Table 38, Figure 79).

In 2002 the Fundy Weir Fishermen Association, Inc. (FWFA), in partnership with the New Brunswick Department of Agriculture, Fisheries and Aquaculture, the Grand Manan Fishermen's Association, Connors Brothers Ltd. and Fisheries and Oceans, Canada, initiated a tagging program, to be conducted over a three year period. The purpose of this project was to investigate the seasonal movements and migration of herring in the Bay of Fundy with the long-term goal of providing information on stock structure. The application of tags concluded this year and no more tagging is planned by the FWFA. Since the start of this project a total of 123,400 herring have been tagged and 3,840 tags have been recovered to date. The latest results are summarized by Waters (2005).

Preliminary results from tagging studies conducted on weir fish since August 2002 have indicated a link between the fish caught in the weir fishery and those caught in the fall and winter purse seine fishery off Grand Manan. The juvenile fish caught in the purse seine fishery are counted against the 4VWX quota, whilst those caught in the weirs are considered to be of Subarea 5 origin. The recent US management plans (NEFSC 1998, 2004) assumes that all of the juvenile herring from this fishery originate from the US "coastal complex" (5Y + 5Z) which is reported to be at reduced levels of abundance.

## 6) 5Z Georges Bank

The activities of midwater trawlers and herring purse seiners on the Canadian portion of Georges Bank (area 5Z) were monitored and there were no reported landings (Table 1).

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Table 1. 4VWX herring fishery landings (t) by month, gear sector and management unit for 2004-2005 quota year.

|                      | Area  | Gear                   | 1   | 2 | 3 | 4  | 5     | 6     | 7      | 8     | 9      | 10    | 11  | 12  | Tota   |
|----------------------|-------|------------------------|-----|---|---|----|-------|-------|--------|-------|--------|-------|-----|-----|--------|
| S.W. Nova Scotia     | 4X    | Fall P. Seine (2004)   |     |   |   |    |       |       |        |       |        | 1,404 | 626 |     | 2,030  |
|                      |       | Winter P. Seine (2005) | 571 |   |   |    |       |       |        |       |        |       |     |     | 571    |
|                      |       | Summer P. Seine (2005) |     |   |   |    | 1,445 | 2,823 | 13,745 | 8,952 | 10,498 | 6,024 |     |     | 43,487 |
|                      |       | Gillnet "Stock"        |     |   |   |    |       | 35    | 89     |       | 443    |       |     |     | 566    |
|                      |       | N.S. Weirs             |     |   |   | 11 | 84    | 731   | 472    | 828   | 118    |       |     |     | 2,245  |
| S.W. Nova Scotia To  | tal   |                        | 571 |   |   |    | 1,529 | 3,589 | 14,306 | 9,780 | 11,058 | 7,428 | 626 | -   | 48,899 |
| Coastal Nova         | 4Vn   | Glace Bay Gillnet      |     |   |   |    |       | 0     |        |       | 245    | 381   |     |     | 626    |
| (South Shore.        | 4W    | Eastern Shore Gillnet  |     |   |   |    |       |       |        |       | 998    | 2,264 | 184 |     | 3,446  |
| Eastern Shore.       | 4X    | Trap                   |     |   |   |    |       |       |        | 45    |        |       |     |     | 45     |
| Cape Breton)         | 4X    | Little Hope Gillnet    |     |   |   |    |       | 0     | 0      | 0     | 24     | 2,214 |     |     | 2,239  |
| Coastal Nova Scotia  | Total |                        |     |   |   |    |       | 0     | 0      | 45    | 1,267  | 4,859 | 184 |     | 6,355  |
| Offshore S.S.        | 4WX   | Offshore P. Seine      |     |   |   |    | 530   | 3,689 | 84     |       |        |       |     |     | 4,303  |
| Changre G.G.         | 1     | Midwater Trawl         |     |   |   |    |       | -1    |        |       |        |       | 697 | 188 | 885    |
|                      |       | Bottom Trawl + Misc.   | 0   | 1 | 1 | 2  | 9     | 14    | 8      | 5     | 4      | 13    | 14  | 3   | 75     |
| Offshore S.S. Total  |       |                        | 0   | 1 | 1 | 2  | 539   | 3,703 | 92     | 5     | 4      | 13    | 711 | 191 | 5,263  |
| Migrant              | 4X    | N.B. Weirs             |     | _ | _ |    |       | 213   | 802    | 7,145 | 3,729  | 740   | 11  |     | 12,639 |
| Juveniles            |       | N.B. Shutoff           |     |   |   |    |       |       |        | 118   | 104    | 19    | 134 | 40  | 416    |
| Migrant Juveniles To | otal  |                        |     |   |   |    | 6     | 213   | 802    | 7,264 | 3,833  | 759   |     |     | 13,055 |
| Georges Bank         | 5ZE   | 5Z Purse Seine         |     |   |   |    |       |       |        |       |        |       |     |     |        |
|                      |       | Midwater Trawl         |     |   |   |    |       |       |        |       |        |       |     |     | *      |
| Georges Bank Total   |       |                        |     |   |   |    |       |       |        |       |        |       |     |     |        |

Total 2004-05 73,572

Table 2. 4WX herring fishery landings (t) by month and gear sector for 2005-2006 quota year (as of March 26, 2006).

|                        | Area | Gear                  | 1     | 2   | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10  | 11 | 12 | Total |
|------------------------|------|-----------------------|-------|-----|---|---|---|---|---|---|---|-----|----|----|-------|
| 2005-06 quota year     | 4X   | Fall 2005 P. Seine    |       |     |   |   |   |   |   |   |   | 468 |    |    | 468   |
|                        |      | Winter 2006 P. Seine  | 462   |     |   |   |   |   |   |   |   |     |    |    | 462   |
|                        | 4WX  | Bottom Trawl          | 1     | . 1 |   |   |   |   |   |   |   |     |    |    | 2     |
|                        | 4VWX | Midwater Trawl (Stem) | 729   |     |   |   |   |   |   |   |   |     |    |    | 729   |
| 2005-06 Total (to date | )    |                       | 1,192 |     |   |   |   |   |   |   |   | 468 | 4  |    | 1,661 |

Table 3. Historical series of nominal and adjusted annual landings (t) by major gear components and seasons of the 4WX herring fishery, 1963-2006 (the 1963-73 Offshore Scotian Shelf landings are from Stephenson et al. (1987)).

|       |             |             |             |         | 4Xr    | 4MX      | 4WX       | 4WX     | Non-Stock | Offshore | Total   |
|-------|-------------|-------------|-------------|---------|--------|----------|-----------|---------|-----------|----------|---------|
|       | 4W          | 4Xs         | 4Xqr        | 4X      | Nova   | Stock    | Stock     | Stock   | 4Xs       | Scotian  | 4W      |
| Year^ | Winter      | Fall&Winter | Summer      | Summer  | Scotin | Nominal  | Adjusted  | TAC     | N.B. Weir | Shelf    | Adjusto |
|       | Purse Seine | Purse Seine | Purse Seine | Gillnet | Weir   | Landings | Landings* |         | & Shutoff | Banks    | Landing |
| 1963  |             | 6.871       | 15,093      | 2.955   | 5,345  | 30,264   | 30,264    |         | 29,366    | 3,000    | 62,63   |
| 1964  |             | 15991       | 24,894      | 4.053   | 12.458 | 57,396   | 57,396    |         | 29,432    | 2.000    | 88,82   |
| 1965  |             | 15,755      | 54,527      | 4.091   | 12,021 | 86,394   | 86.394    | 1       | 33,346    | 6.000    | 125.74  |
| 1966  |             | 25.645      | 112,457     | 4.413   | 7,711  | 150,226  | 150,226   | 1       | 35,805    | 2.000    | 188,03  |
| 1967  |             | 20.888      | 117,382     | 5,398   | 12,475 | 156.143  | 156,741   | - 1     | 30.032    | 1.000    | 187,77  |
| 1968  |             | 42.223      | 133,267     | 5.884   | 12.571 | 193.945  | 196,362   | - 1     | 33,145    | 18.000   | 247.50  |
| 1969  | 25.112      | 13.202      | 84,525      | 3,474   | 10,744 | 137.057  | 150,462   |         | 26,539    | 121.000  | 298.00  |
| 1970  | 27.107      | 14.749      | 74,849      | 5.019   | 11,706 | 133.430  | 190,382   |         | 15,840    | 87,000   | 293,22  |
| 1971  | 52,535      | 4.868       | 35,071      | 4.607   | 8,081  | 105,162  | 129,101   | 1       | 12,660    | 28.000   | 169,76  |
| 1972  | 25.656      | 32.174      | 61,158      | 3.789   | 6,766  | 129.543  | 153,449   | 1       | 32,699    | 21.000   | 207,14  |
| 1973  | 8.348       | 27.322      | 36,618      | 5.205   | 12.492 | 89.985   | 122.687   |         | 19,935    | 14.000   | 156,62  |
| 1974  | 27.044      | 10.563      | 76,859      | 4.285   | 6.436  | 125.187  | 149.670   |         | 20,602    |          | 170,27  |
| 1975  | 27,030      | 1.152       | 79.605      | 4,995   | 7,404  | 120.186  | 143,897   |         | 30,819    |          | 174.71  |
| 1976  | 37,196      | 746         | 58,395      | 8,322   | 5.959  | 110.618  | 115,178   |         | 29,206    |          | 144.38  |
| 1977  | 23,251      | 1,236       | 68,538      | 18,523  | 5.213  | 116.761  | 117,171   | 109,000 | 23,487    |          | 140.65  |
| 1978  | 17,274      | 6,519       | 57,973      | 6.059   | 8.057  | 95.882   | 114,000   | 110,000 | 38,842    |          | 152.84  |
| 1979  | 14,073      | 3,839       | 25,265      | 4,363   | 9,307  | 56,847   | 77,500    | 99,000  | 37,828    |          | 115.33  |
| 1980  | 8,958       | 1.443       | 44,986      | 19,804  | 2.383  | 77.574   | 107,000   | 65.000  | 13,525    |          | 120.50  |
| 1981  | 18,588      | 1.368       | 53,799      | 11.985  | 1.966  | 87,706   | 137,000   | 100,000 | 19,080    |          | 156.08  |
| 1982  | 12.275      | 103         | 64,344      | 6.799   | 1.212  | 84,733   | 105,800   | 80,200  | 25,963    |          | 131.76  |
| 1983  | 8.226       | 2.157       | 63,379      | 8,762   | 918    | 83.442   | 117,400   | 82,000  | 11,383    |          | 128.78  |
| 1984  | 6,336       | 5.683       | 58,354      | 4,490   | 2.684  | 77,547   | 135,900   | 80,000  | 8,698     | 1        | 144.59  |
| 1985  | 8.751       | 5,419       | 87,167      | 5.584   | 4.062  | 110.983  | 165,000   | 125.000 | 27,863    |          | 192.86  |
| 1986  | 8.414       | 3,365       | 56.139      | 3,533   | 1.958  | 73,409   | 100,000   | 97,600  | 27,883    |          | 127.88  |
| 1987  | 8.780       | 5.139       | 77,706      | 2,289   | 6.786  | 100.700  | 147,100   | 126,500 | 27,320    |          | 174.42  |
| 1988  | 8.503       | 7.876       | 98,371      | 695     | 7.518  | 124,653  | 199,600   | 151.200 | 33,421    |          | 233.02  |
| 1989  | 6,169       | 5,896       | 68.089      | 95      | 3,308  | 83,557   | 97,500    | 151,200 | 44,112    |          | 141.61  |
| 1990  | 8,316       | 10,705      | 77,545      | 243     | 4.049  | 102.627  | 172.900   | 151,200 | 38,778    |          | 211.67  |
| 1991  | 17.878      | 2.024       | 73.619      | 538     | 1.498  | 97.010   | 130,800   | 151.200 | 24,576    |          | 155.37  |
| 1992  | 14,310      | 1.298       | 80,807      | 395     | 2.227  | 100,227  | 136,000   | 125,000 | 31,967    |          | 167.96  |
| 1993  | 10.731      | 2.376       | 81.478      | 556     | 2.662  | 98.464   | 105,089   | 151,200 | 31,573    |          | 136.66  |
| 1994  | 9,872       | 3,174       | 64,509      | 339     | 2.045  | 80,099   | 80,099    | 151.200 | 22.241    |          | 102,34  |
| 1995  | 3,191       | 7,235       | 48.481      | 302     | 3.049  | 62,499   | 62,499    | 80.000  | 18.248    |          | 80.74   |
| 1996  | 2,049       | 3,305       | 42.708      | 6,340   | 3.476  | 58,068   | 58,068    | 57.000  | 15,913    | 11,745   | 85,72   |
| 1997  | 1.759       | 2,926       | 40.357      | 6,816   | 4.019  | 56.117   | 56,117    | 57.000  | 20,552    | 20,261   | 96,93   |
| 1998  | 1.405       | 1.494       | 67.433      | 2.231   | 4.464  | 77,027   | 77,027    | 90.000  | 20.091    | 5.591    | 102.70  |
| 1999  | 1,235       | 4,764       | 64,432      | 1,660   | 5,461  | 77.552   | 77,552    | 105,000 | 18,644    | 12,646   | 108,84  |
| 2000  | 1,012       | 4,738       | 78,010      | 823     | 701    | 85,284   | 85,284    | 100,000 | 16,829    | 2,182    | 104.29  |
| 2001  | 0           | 4,001       | 62.004      | 1.857   | 3.708  | 71,570   | 71,570    | 78.000  | 20,209    | 12.503   | 104.29  |
| 2002  | 367         | 5,257       | 69.894      | 393     | 1.143  | 77,054   | 77,054    | 78,000  | 11.874    | 7,039    | 95.96   |
| 2003  | 0           | 8,860       | 79.140      | 439     | 921    | 89,360   | 89,360    | 93.000  | 9,003     | 998      | 99,36   |
| 2004  | 0           | 5,659       | 69,015      | 225     | 3.130  | 78,029   | 78,029    | 83,000  | 20,686    | 4,165    | 102.88  |
| 2005  | 0           | 2,601       | 43,487      | 566     | 2,245  | 48,899   | 48,899    | 50,000  | 13,055    | 5,263    | 67,21   |

Annual landings by purse seiners are defined for the period from October 15 of the preceding year to October 14 of the current year.

All landings by other gear types are for the calendar year

<sup>\*</sup>Adjusted totals includes misreporting adjustments for 1978-84 (Mace 1985) and for 1985-93 (Stephenson 1993, Stephenson et al 1994)

Table 4. Summary of herring purse seine catches (t) from 1984 to 2005 by fishing grounds for 4WX stock and non-stock areas.

|                   |      |       |       |       |        |       |       |       |       |       | Ye    | ar    |       |       |       |       |       |       |       |       |       |       |          |
|-------------------|------|-------|-------|-------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|
| Stock Areas       | 1984 | 1985  | 1986  | 1987  | 1988   | 1989  | 1990  | 1991  | 1992  | 1993  | 1994  | 1995  | 1996  | 1997  | 1998  | 1999  | 2000  | 2001  | 2002  | 2003  | 2004  | 2005  | Avg 94-0 |
| Browns Bank       |      |       | 732   |       |        |       |       |       | 86    |       | 1903  | 1554  | 40    | 14    | 3139  | 2197  | 1137  | 486   |       |       | 45    |       | 116      |
| Chedabucto Bay    | 490  | 4216  | 7498  | 6374  | 7523   | 8325  | 12470 | 12596 | 3084  | 1378  | 1407  | 2049  | 1759  |       | 1583  | 1151  | 10    |       |       |       |       |       | 132      |
| Gannet, Dry Ledge |      | 5675  | 2187  | 1474  | 14901  | 2010  | 4213  | 6294  | 18527 | 2935  | 2588  | 2693  | 1963  | 4590  | 4156  | 10296 | 12674 | 3877  | 9047  | 6965  | 4456  | 3117  | 553      |
| German Bank       |      | 15522 | 13346 | 16547 | 18392  | 8087  | 11744 | 23193 | 3235  | 4045  | 9662  | 19549 | 15898 | 13576 | 20556 | 24660 | 25631 | 24139 | 22355 | 21573 | 14175 | 14171 | 1882     |
| Grand Manan       | 372  | 4989  | 5823  | 4298  | 4440   | 4300  | 5442  | 4225  | 2722  | 783   | 6846  | 5297  | 6005  | 5312  | 15983 | 7912  | 18185 | 10545 | 17753 | 17258 | 7542  | 5740  | 1036     |
| Long Island       |      | 974   | 3365  | 7499  | 10722  | 21719 | 18484 | 9470  | 3213  | 2814  | 7666  | 7906  | 4385  | 3557  | 12360 | 18286 | 11199 | 12904 | 6642  | 12639 | 13115 | 8037  | 989      |
| Lurcher           |      | 476   | 132   |       | 2928   | 18    | 65    | 151   | 2141  | 1560  | 530   | 382   | 243   | 599   | 57    |       | 715   | 227   | 7683  | 1872  | 7268  | 1692  | 193      |
| N.B. Coastal      | 384  | 188   | 621   | 960   | 1031   | 3033  | 2347  | 488   | 992   | 598   | 99    | 1502  | 271   | 1176  | 782   | 1867  | 361   | 1250  | 3113  | 3914  | 2707  | 787   | 148      |
| Pollock Point     |      |       |       |       |        |       |       |       |       |       |       |       |       |       |       |       |       | 1563  |       |       |       |       | 156      |
| S.W. Grounds      | 1    | 558   | 1108  | 184   | 181    | 276   | 56    | 521   | 225   | 2961  | 3444  | 6205  | 3035  | 797   | 1239  | 3241  | 1879  | 53    | 791   | 73    |       | 1228  | 199      |
| Scots Bay         | 1    |       | 36    | 3822  | 4145   | 6583  | 9003  | 7982  | 7987  | 5258  | 10840 | 980   | 8984  | 4894  | 8210  | 1789  | 10926 | 10739 | 8202  | 19196 | 24869 | 6239  | 965      |
| Seal Island       |      | 13818 | 8894  | 11560 | 19019  | 23420 | 25344 | 12740 | 10455 | 3874  | 2820  | 465   | 1567  | 492   | 617   | 567   | 206   | 101   | 238   | 1096  |       | 1358  | 866      |
| Trinity           |      | 35860 | 13505 | 18744 | 18539  | 266   | 1113  | 3259  | 4612  | 1348  | 2366  | 370   | 3448  | 5308  | 2825  | 1220  | 103   | 113   | 1609  |       | 370   | 1448  | 174      |
| Yankee Bank       | 1    |       |       |       | 194    | 250   | 3647  | 817   | 119   | 10    | 175   | 323   | 9     | 4     | 159   | 82    | 133   | 8     | 78    |       |       | 528   | 150      |
| Unknown           | 45   | 184   | 500   | 200   |        |       | 200   | 579   | 494   | 140   |       | 73    |       |       | 62    | 84    | 27    |       |       | 1103  | 127   | 181   | 23       |
| 4WX Stock Total   | 1291 | 82458 | 57745 | 71661 | 102015 | 78287 | 94127 | 82314 | 57888 | 27703 | 50345 | 49348 | 47606 | 40319 | 71727 | 73350 | 83186 | 66005 | 77511 | 85689 | 74674 | 44526 | 6369     |
| Nonstock Areas    | 1984 | 1985  | 1986  | 1987  | 1988   | 1989  | 1990  | 1991  | 1992  | 1993  | 1994  | 1995  | 1996  | 1997  | 1998  | 1999  | 2000  | 2001  | 2002  | 2003  | 2004  | 2005  | Avg 94-0 |
| Georges Bank      |      |       |       |       |        |       | 91    | 64    |       |       | 266   |       | 2491  | 79    |       |       | 265   |       |       |       |       |       | 77       |
| Liverpool         |      |       |       |       |        |       |       | 13    |       | 4067  | 4177  |       |       |       |       |       |       |       |       |       |       |       | 417      |
| Shelburne         | 1    |       |       | 59    |        |       |       | 64    |       | 526   | 161   |       | 56    |       |       |       |       |       |       |       |       | 29    | 8        |
| Halifax           |      |       |       |       |        |       |       |       |       | 652   | 1945  |       | 585   | 455   |       |       | 1002  | 472   | 367   |       |       |       | 68       |
| Offshore Banks    |      |       |       |       |        |       |       |       |       |       |       |       | 11800 | 18770 | 4284  | 8669  | 1645  | 3977  | 5078  | 722   | 4054  | 4115  | 631      |
| Western Hole      | 1    |       | 41    | 154   |        |       |       | 213   | 3451  | 2255  | 1495  | 108   | 127   | 691   | 1012  | 1057  | 47    | 7712  | 1884  | 156   |       | 214   | 131      |
| Sydney Bight      |      | 3511  | 4250  | 1751  | 2100   | 1330  | 3591  | 3606  |       | 396   |       | 3951  | 4267  |       | 52    |       |       |       |       |       |       |       | 275      |
| Nonstock Total    |      | 3511  | 4291  | 1964  | 2100   | 1330  | 3682  | 3959  | 3451  | 7896  | 8044  |       |       | 19995 | 5348  | 9726  | 2958  | 12161 | 7329  | 878   | 4054  | 4358  | 818      |
| Overall Total     | 1291 | 85968 | 62036 | 73625 | 104116 | 70047 | 07000 | 86273 | 61339 | 25500 | 58389 | 53407 | 66931 | 00044 | 77075 | 83076 | 86144 | 78166 | 84840 | 86567 | 78728 | 48884 | 7187     |

Table 5. Summary of the percentage of herring purse seine catches from 1984 to 2005 by fishing grounds for 4WX stock and non-stock areas.

| Stock Areas       | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | Avg 94-05 |
|-------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------|
| Browns Bank       |      |      | 1%   |      |      |      |      |      | 0%   |      | 3%   | 3%   | 0%   | 0%   | 4%   | 3%   | 1%   | 1%   |      |      | 0%   |      | 1%        |
| Chedabucto Bay    | 38%  | 5%   | 12%  | 9%   | 7%   | 10%  | 13%  | 15%  | 5%   | 4%   | 2%   | 4%   | 3%   |      | 2%   | 1%   | 0%   |      |      |      |      |      | 1%        |
| Gannet, Dry Ledge |      | 7%   | 4%   | 2%   | 14%  | 3%   | 4%   | 7%   | 30%  | 8%   | 4%   | 5%   | 3%   | 8%   | 5%   | 12%  | 15%  | 5%   | 1196 | 8%   | 6%   | 6%   | 7%        |
| German Bank       |      | 18%  | 22%  | 22%  | 18%  | 10%  | 12%  | 27%  | 5%   | 11%  | 17%  | 37%  | 24%  | 23%  | 27%  | 30%  | 30%  | 31%  | 26%  | 25%  | 18%  | 29%  | 26%       |
| Grand Manan       | 29%  | 6%   | 9%   | 6%   | 4%   | 5%   | 6%   | 5%   | 4%   | 2%   | 12%  | 10%  | 9%   | 9%   | 21%  | 10%  | 21%  | 13%  | 21%  | 20%  | 10%  | 12%  | 14%       |
| Long Island       |      | 1%   | 5%   | 10%  | 10%  | 27%  | 19%  | 11%  | 5%   | 8%   | 13%  | 15%  | 7%   | 6%   | 16%  | 22%  | 13%  | 17%  | 8%   | 15%  | 17%  | 16%  | 14%       |
| Lurcher           | 1    | 1%   | 0%   |      | 3%   | 0%   | 0%   | 0%   | 3%   | 4%   | 1%   | 1%   | 0%   | 1%   | 0%   |      | 1%   | 0%   | 9%   | 2%   | 9%   | 3%   | 2%        |
| N.B. Coastal      | 30%  | 0%   | 1%   | 1%   | 1%   | 4%   | 2%   | 1%   | 2%   | 2%   | 0%   | 3%   | 0%   | 2%   | 1%   | 2%   | 0%   | 2%   | 4%   | 5%   | 3%   | 2%   | 2%        |
| Pollock Point     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 2%   |      |      |      |      | 0%        |
| S.W. Grounds      | 1    | 1%   | 2%   | 0%   | 0%   | 0%   | 0%   | 1%   | 0%   | 8%   | 6%   | 12%  | 5%   | 1%   | 2%   | 4%   | 2%   | 0%   | 196  | 0%   |      | 3%   | 3%        |
| Scots Bay         | 1    |      | 0%   | 5%   | 4%   | 8%   | 9%   | 9%   | 13%  | 15%  | 19%  | 2%   | 13%  | 8%   | 11%  | 2%   | 13%  | 14%  | 10%  | 22%  | 32%  | 13%  | 13%       |
| Seal Island       |      | 16%  | 14%  | 16%  | 18%  | 29%  | 26%  | 15%  | 17%  | 11%  | 5%   | 1%   | 2%   | 1%   | 1%   | 1%   | 0%   | 0%   | 0%   | 1%   |      | 3%   | 1%        |
| Trinity           |      | 42%  | 22%  | 25%  | 18%  | 0%   | 1%   | 4%   | 8%   | 4%   | 4%   | 1%   | 5%   | 9%   | 4%   | 1%   | 0%   | 0%   | 2%   |      | 0%   | 3%   | 2%        |
| Yankee Bank       |      |      |      |      | 0%   | 0%   | 4%   | 1%   | 0%   | 0%   | 0%   | 1%   | 0%   | 0%   | 0%   | 0%   | 0%   | 0%   | 0%   |      |      | 1%   | 0%        |
| Unknown           | 4%   | 0%   | 1%   | 0%   |      |      | 0%   | 1%   | 1%   | 0%   |      | 0%   |      |      | 0%   | 0%   | 0%   |      |      | 1%   | 0%   | 0%   | 0%        |
| Total             | 100% | 96%  | 93%  | 97%  | 98%  | 98%  | 96%  | 95%  | 94%  | 78%  | 86%  | 92%  | 71%  | 67%  | 93%  | 88%  | 97%  | 84%  | 91%  | 99%  | 95%  | 91%  | 88%       |

| Stock Areas         | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | Avg 94-05 |
|---------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------|
| Georges Bank        |      |      |      |      |      |      | 0%   | 0%   |      |      | 0%   |      | 4%   | 0%   |      |      | 0%   |      |      |      |      |      | 0%        |
| Liverpool           |      |      |      |      |      |      |      | 0%   |      | 11%  | 7%   |      |      |      |      |      |      |      |      |      |      |      | 1%        |
| Shelburne           |      |      |      | 0%   |      |      |      | 0%   |      | 196  | 0%   |      | 0%   |      |      |      |      |      |      |      |      | 0%   | 0%        |
| Halifax             |      |      |      |      |      |      |      |      |      | 2%   | 3%   |      | 1%   | 1%   |      |      | 1%   | 1%   | 0%   |      |      |      | 1%        |
| Offshore Banks      |      |      |      |      |      |      |      |      |      |      |      |      | 18%  | 31%  | 6%   | 10%  | 2%   | 5%   | 6%   | 1%   | 5%   | 8%   | 8%        |
| Western Hole        |      |      | 0%   | 0%   |      |      |      | 0%   | 6%   | 6%   | 3%   | 0%   | 0%   | 1%   | 1%   | 1%   | 0%   | 10%  | 2%   | 0%   |      | 0%   | 2%        |
| Sydney Bight        |      | 4%   | 7%   | 2%   | 2%   | 2%   | 4%   | 4%   |      | 1%   |      | 7%   | 6%   |      | 0%   |      |      |      |      |      |      |      | 1%        |
| Misc Nonstock Total |      | 4%   | 7%   | 3%   | 2%   | 2%   | 4%   | 5%   | 6%   | 22%  | 14%  | 8%   | 29%  | 33%  | 7%   | 12%  | 3%   | 16%  | 9%   | 1%   | 5%   | 9%   | 12%       |

Table 6. Monthly weir landings (t) for weirs located in New Brunswick and Nova Scotia; 1978 to 2005.

|                      |              |          | _  | _   | _  |          |       | MON            |                |        |       |              |     |            |
|----------------------|--------------|----------|----|-----|----|----------|-------|----------------|----------------|--------|-------|--------------|-----|------------|
| PROVINCE             | YEAR         | 1        | 2  | 3   | 4  | 5        | 6     | 7              | 8              | 9      | 10    | 11           |     | Year Total |
| N.B.                 | 1978<br>1979 | 3<br>535 | 00 |     |    | 512      |       | 5,499          | 10,275         | 10,877 |       | 528          | 132 | 33,599     |
|                      |              | 535      | 90 |     |    | 25       | 1,120 |                | 9,846          |        | 5,985 | 2,638        | 74  | 32,579     |
|                      | 1980<br>1981 |          |    |     |    | 36<br>70 |       | 1,755          | 5,572          |        | 1,016 | 216<br>1,686 | 192 | 11,066     |
|                      | 1982         |          | 17 |     |    | 132      |       | 4,431<br>2,871 | 3,911<br>7,311 |        | 3,204 | 849          | 87  | 22,181     |
|                      | 1983         |          | 17 |     |    | 65       | 29    | 299            | 2.474          |        | 3,945 | 375          | 0/  | 12,568     |
|                      | 1984         |          |    |     |    | 6        | 3     | 230            | 2,344          |        | 3.045 | 145          |     | 8,353      |
|                      | 1985         |          |    |     |    | 22       |       | 4.217          | 8,450          |        | 4,814 |              | 138 | 26,718     |
|                      | 1986         | 43       |    |     |    | 17       | 69    | 2,480          | 10,114         |        | 6,233 | 2.564        | 67  | 27,516     |
|                      | 1987         |          | 21 | 6   | 12 | 10       | 168   | 2,575          | 10,893         |        | 5,362 | 703          | 122 | 26,621     |
|                      | 1988         | 95       |    |     | 90 | 657      |       |                | 11,975         |        | 8,457 |              | 43  | 38,235     |
|                      | 1989         |          | 24 |     | 95 | 37       |       |                | 15,093         | 10,156 |       | 2,158        | 40  | 43,520     |
|                      | 1990         |          |    | ,   | 00 | 93       |       |                | 14,664         | 12,207 |       | 168          |     | 39,808     |
|                      | 1991         |          |    |     |    | 57       | _     |                | 10,319         |        | 2,028 | 93           |     | 23,717     |
|                      | 1992         |          |    |     | 15 | 50       |       |                | 10,989         |        | 4,395 | 684          |     | 31,981     |
|                      | 1993         |          |    |     |    | 14       |       |                | 14,085         |        | 2,406 | 470          | 10  | 31,328     |
|                      | 1994         |          |    |     | 18 |          |       |                | 10,592         | -      | 1,589 | 30           |     | 20,618     |
|                      | 1995         |          |    |     |    | 15       |       | 4,517          | 8,590          | 3,956  | 896   | 10           |     | 18,228     |
|                      | 1996         |          |    |     |    | 19       |       | 4,819          | 7,767          | 1,917  | 518   | 65           |     | 15,781     |
|                      | 1997         |          |    |     | 8  |          | 1,017 |                | 7,396          | 5,316  |       |              |     | 20,396     |
|                      | 1998         |          |    |     | _  | 560      |       | 3,832          | 8,295          | 5,604  | 525   |              |     | 19,529     |
|                      | 1999         |          |    |     |    | 690      |       | 5,155          | 9.895          | 2,469  | 48    |              |     | 19,063     |
|                      | 2000         |          |    |     |    | 10       |       | 2,105          | 7,533          |        | 1,713 | 69           |     | 16,376     |
|                      | 2001         |          |    |     |    | 35       |       | 3.931          | 8,627          |        | 1,479 |              |     | 20,064     |
|                      | 2002         |          |    |     |    | 84       |       | 1,099          | 6,446          |        | 1,260 | 20           |     | 11,807     |
|                      | 2003         |          |    |     |    | 257      |       | 1,423          | 3,554          | 3,166  | 344   | 10           |     | 9,003      |
|                      | 2004         |          |    |     |    | 21       |       | 2,694          | 8,354          | 8,298  | 913   | 3            |     | 20,620     |
|                      | 2005         |          |    |     |    |          | 213   | 802            | 7,145          | 3,729  | 740   | 11           |     | 12,639     |
| NB Average Catch (t) |              | 155      | 34 | 3 . | 40 | 140      | 340   | 3,857          | 8,661          | 5,800  | 3,086 | 746          | 96  | 22,460     |
| N.S.                 | 1978         |          |    |     | 1  | 490      | 3,704 | 2,990          | 239            | 46     | 111   | 198          | 79  | 7,858      |
|                      | 1979         |          |    |     |    | 811      | 3,458 | 1,418          | 420            | 39     | 136   | 57           |     | 6,339      |
|                      | 1980         |          |    |     |    | 69       | 647   | 1,271          | 395            |        |       |              |     | 2,383      |
|                      | 1981         |          |    |     |    | 50       | 437   | 983            | 276            | 37     |       | 41           |     | 1,824      |
|                      | 1982         |          |    |     |    | 16       | 267   | 468            | 195            | 172    | 12    |              |     | 1,130      |
|                      | 1983         |          |    |     | 2  | 286      | 141   | 188            | 208            | 53     |       | 18           |     | 896        |
|                      | 1984         |          |    |     |    | 113      | 1,032 | 736            | 602            | 220    |       |              |     | 2,702      |
|                      | 1985         |          |    |     |    | 378      | 1,799 | 1,378          | 489            |        |       | 11           |     | 4,055      |
|                      | 1986         |          |    |     |    | 385      | 403   | 71             | 704            | 390    | 5     |              |     | 1,957      |
|                      | 1987         |          |    |     |    |          | 2,526 | 1,215          | 1,166          | 367    |       |              |     | 6,776      |
|                      | 1988         |          |    |     |    |          | 2,976 | 1,696          | 1,204          | 386    |       |              |     | 7,480      |
|                      | 1989         |          |    |     |    |          | 1,018 | 870            | 843            | 226    |       |              |     | 3,296      |
|                      | 1990         |          |    |     | _  | 208      | 973   | 1,482          | 879            | 538    | 52    |              |     | 4,132      |
|                      | 1991         |          |    |     | 3  | 23       | 149   | 719            | 342            | 262    |       |              |     | 1,498      |
|                      | 1992         |          |    |     |    | 35       | 659   | 405            | 754            | 371    |       |              |     | 2,224      |
|                      | 1993         |          |    |     |    | 226      | 908   | 608            | 867            | 53     |       |              |     | 2,662      |
|                      | 1994         |          |    |     |    | 111      | 736   | 499            | 519            | 180    |       |              |     | 2,045      |
|                      | 1995         |          |    |     |    |          | 1,255 | 1,059          | 470            | 29     |       |              |     | 3,049      |
|                      | 1996         |          |    |     |    |          | 1,267 | 1,232          | 358            | 188    |       |              |     | 3,476      |
|                      | 1997         |          |    |     |    |          |       |                | 271            | 65     |       |              |     | 4,019      |
|                      | 1998         |          |    |     |    |          | 1,677 | 390            | 359            | 317    |       |              |     | 4,048      |
|                      | 1999         |          |    |     |    | 1,958    | 1,513 | 547            | 488            | 31     |       |              |     | 4,537      |
|                      | 2000         |          |    |     |    |          | 16    | 151            | 326            | 191    |       |              |     | 683        |
|                      | 2001         |          |    |     |    |          | 1,439 | 1,565          | 391            | 207    |       |              |     | 3,708      |
|                      | 2002         |          |    |     |    | 23       | 95    | 240            | 558            | 228    |       |              |     | 1,143      |
|                      | 2003         |          |    |     |    | 98       | 126   | 68             | 344            | 284    |       |              |     | 92         |
|                      | 2004         |          |    |     |    |          | 667   | 873            | 1,370          | 219    |       |              |     | 3,130      |
|                      | 2005         |          |    |     | 11 | 84       | 731   | 472            | 828            | 118    |       |              |     | 2,24       |
| NS Average Catch (t) |              | 1        |    |     | 5  | 406      | 1,160 | 905            | 567            | 201    | 63    | 65           | 79  | 3,22       |

Table 7. Overall effort from New Brunswick and Nova Scotia weirs for catch (t), number of active weirs and the catch per weir (t) for the period 1978 to 2005.

|         | Annual Catch (t) |       |             | No. Activ | e We | eirs      | Catch per | weir | (t)     |
|---------|------------------|-------|-------------|-----------|------|-----------|-----------|------|---------|
| Year    | NB               | NS    | Total Catch | NB        | NS   | Total No. | NB        | NS   | Average |
| 1978    | 33,599           | 7,858 | 41,458      | 208       | 31   | 239       | 162       | 253  | 173     |
| 1979    | 32,579           | 6,339 | 38,918      | 210       | 27   | 237       | 155       | 235  | 164     |
| 1980    | 11,066           | 2,383 | 13,449      | 120       | 29   | 149       | 92        | 82   | 90      |
| 1981    | 14,968           | 1,824 | 16,793      | 147       | 28   | 175       | 102       | 65   | 96      |
| 1982    | 22,181           | 1,130 | 23,311      | 159       | 19   | 178       | 140       | 59   | 131     |
| 1983    | 12,568           | 896   | 13,464      | 143       | 23   | 166       | 88        | 39   | 81      |
| 1984    | 8,353            | 2,702 | 11,056      | 116       | 13   | 129       | 72        | 208  | 86      |
| 1985    | 26,718           | 4,055 | 30,774      | 156       | 14   | 170       | 171       | 290  | 181     |
| 1986    | 27,516           | 1,957 | 29,473      | 105       | 18   | 123       | 262       | 109  | 240     |
| 1987    | 26,621           | 6,776 | 33,397      | 123       | 21   | 144       | 216       | 323  | 232     |
| 1988    | 38,235           | 7,480 | 45,715      | 191       | 21   | 212       | 200       | 356  | 216     |
| 1989    | 43,520           | 3,296 | 46,817      | 171       | 20   | 191       | 255       | 165  | 245     |
| 1990    | 39,808           | 4,132 | 43,940      | 154       | 22   | 176       | 258       | 188  | 250     |
| 1991    | 23,717           | 1,498 | 25,216      | 143       | 20   | 163       | 166       | 75   | 155     |
| 1992    | 31,981           | 2,224 | 34,206      | 151       | 12   | 163       | 212       | 185  | 210     |
| 1993    | 31,328           | 2,662 | 33,990      | 145       | 10   | 155       | 216       | 266  | 219     |
| 1994    | 20,618           | 2,045 | 22,662      | 129       | 11   | 140       | 160       | 186  | 162     |
| 1995    | 18,228           | 3,049 | 21,277      | 106       | 10   | 116       | 172       | 305  | 183     |
| 1996    | 15,781           | 3,476 | 19,257      | 101       | 12   | 113       | 156       | 290  | 170     |
| 1997    | 20,396           | 4,019 | 24,415      | 102       | 15   | 117       | 200       | 268  | 209     |
| 1998    | 19,529           | 4,048 | 23,577      | 108       | 15   | 123       | 181       | 270  | 192     |
| 1999    | 19,063           | 4,537 | 23,600      | 100       | 14   | 114       | 191       | 324  | 207     |
| 2000    | 16,376           | 683   | 17,058      | 77        | 3    | 80        | 213       | 228  | 213     |
| 2001    | 20,064           | 3,708 | 23,772      | 101       | 14   | 115       | 199       | 265  | 207     |
| 2002    | 11,807           | 1,143 | 12,950      | 83        | 9    | 92        | 142       | 127  | 141     |
| 2003    | 9,003            | 921   | 9,924       | 78        | 8    | 86        | 115       | 115  | 115     |
| 2004    | 20,620           | 3,130 | 23,750      | 84        | 8    | 92        | 245       | 391  | 258     |
| 2005    | 12,639           | 2,245 | 14,884      | 76        | 10   | 86        | 166       | 225  | 173     |
| Average | 22,460           | 3,222 | 25,682      | 128       | 16   | 144       | 175       | 210  | 179     |

Table 8. Purse seine effort, catch and CPUE levels for 1989 to 2005.

| Year | No.<br>Days<br>Fished | No. of<br>Boats<br>Fishing | Total<br>Catch t | CPUE<br>(catch/slip) | CPUE<br>(catch/boat) |
|------|-----------------------|----------------------------|------------------|----------------------|----------------------|
| 1989 | 2198                  | 40                         | 87,383           | 40                   | 2185                 |
| 1990 | 2390                  | 42                         | 103,537          | 43                   | 2465                 |
| 1991 | 2333                  | 40                         | 88,830           | 38                   | 2221                 |
| 1992 | 2431                  | 39                         | 95,072           | 39                   | 2438                 |
| 1993 | 2542                  | 36                         | 92,828           | 37                   | 2579                 |
| 1994 | 2227                  | 36                         | 75,652           | 34                   | 2101                 |
| 1995 | 1682                  | 32                         | 56,441           | 34                   | 1764                 |
| 1996 | 1781                  | 32                         | 60,038           | 34                   | 1876                 |
| 1997 | 1731                  | 30                         | 61,769           | 36                   | 2059                 |
| 1998 | 2290                  | 28                         | 70,931           | 31                   | 2533                 |
| 1999 | 1775                  | 28                         | 78,574           | 44                   | 2806                 |
| 2000 | 1572                  | 28                         | 78,727           | 50                   | 2812                 |
| 2001 | 1826                  | 21                         | 75,343           | 41                   | 3588                 |
| 2002 | 1838                  | 19                         | 76,210           | 41                   | 4011                 |
| 2003 | 1652                  | 18                         | 85,499           | 52                   | 4750                 |
| 2004 | 1358                  | 18                         | 76,361           | 56                   | 4242                 |
| 2005 | 945                   | 16                         | 48,517           | 51                   | 3032                 |

Table 9. Summary of the spawning stock biomass for each of the surveyed spawning grounds in the Bay of Fundy/SW Nova component of the 4WX stock complex (from Power et al. 2006).

| Location/Year                 | 1997*      | 1998*      | 1999         | 2000         | 2001            | 2002        | 2003         | 2004         | 2005         | Average<br>1999-<br>2005 |
|-------------------------------|------------|------------|--------------|--------------|-----------------|-------------|--------------|--------------|--------------|--------------------------|
| Scots Bay                     | 160,200    | 72,500     | 41,000       | 106,300      | 163,900         | 141,000     | 133,900      | 107,600      | 16,800       | 101,500                  |
| Trinity Ledge                 | 23,000     | 6,800      | 3,900        | 600          | 14,800          | 8,100       | 14,500       | 6,500        | 5,100        | 7,643                    |
| German Bank<br>Spectacle Buoy | 370,400    | 440,700    | 460,800      | 356,400      | 190,500         | 393,100     | 343,500      | 367,600      | 211,000      | 331,843                  |
| - Spring<br>- Fall            | 15,000     | 1,300      | 0            | 0            | 1,100<br>87,500 |             | 1,400        | n/s          | 300          | 560<br>87,500            |
| Sub-Total                     | 568,600    | 521.300    | 505,700      | 463,300      | 457,800         | 542,200     | 493,300      | 481.700      | 233.200      | 453,886                  |
| Seal Island<br>Browns Bank    |            |            |              |              | 3.300<br>45.800 |             | 12,200       |              |              | 5,567<br>45,800          |
| Total                         | 568,600    | 521,300    | 505,700      | 463,300      | 506.900         | 543,400     | 505,400      | 481,700      | 233.200      | 462,800                  |
| Overall SE t<br>Overall SE %  | n/a<br>n/a | n/a<br>n/a | 94,600<br>19 | 64.900<br>14 | 50.800<br>10    | 49.500<br>9 | 86.100<br>17 | 74,200<br>15 | 64,900<br>28 | 69,286<br>16             |

<sup>\*</sup>Biomass estimates prior to 1999 are not considered comparable due to variation in the coverage area.

Table 10. Partial exploitation rates (%) by major spawning grounds and for the overall Bay of Fundy/SW Nova component of the 4WX stock complex with (A1) acoustic survey SSB, (A2) acoustic survey proportion of total SSB, (C1) allocated catch by spawning component, (C2) adjusted catch including non-spawning area catches, exploitation rate as percentage of acoustic SSB for (P1) spawning area catch and (P2) adjusted catch.

| A1) Acoustic Survey SSB (t)      | 1997    | 1998    | 1999    | 2000    | 2001    | 2002    | 2003    | 2004    | 2005    | Avg 99-05 |
|----------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|-----------|
| Scots Bay                        | 160,168 | 72,473  | 40,972  | 106,316 | 163,900 | 141,000 | 133,900 | 107,600 | 16,800  | 101,498   |
| Trinity                          | 23,000  | 6,762   | 3,885   | 621     | 14,800  | 8,100   | 14,500  | 6,500   | 5,100   | 7,644     |
| German Bank                      | 385,400 | 442,033 | 460,823 | 356,372 | 282,400 | 394,357 | 357,100 | 367,600 | 211,000 | 347,093   |
| Total SSB                        | 568,568 | 521,268 | 505,680 | 463,309 | 461,100 | 543,457 | 505,500 | 481,700 | 232,900 | 456,235   |
| A2) Acoustic Survey Proportions  | 1997    | 1998    | 1999    | 2000    | 2001    | 2002    | 2003    | 2004    |         | Avg 99-05 |
| Scots Bay                        | 28%     | 14%     | 8%      | 23%     | 36%     | 26%     | 26%     | 22%     | 7%      | 21%       |
| Trinity                          | 4%      | 1%      | 1%      | 0%      | 3%      | 1%      | 3%      | 1%      | 2%      | 2%        |
| German Bank                      | 68%     | 85%     | 91%     | 77%     | 61%     | 73%     | 71%     | 76%     | 91%     | 77%       |
| Total                            | 100%    | 100%    | 100%    | 100%    | 100%    | 100%    | 100%    | 100%    | 100%    | 100%      |
| C1) Catch by Spawn Area          | 1997    | 1998    | 1999    | 2000    | 2001    | 2002    | 2003    | 2004    | 2005    | Avg 99-05 |
| Scots Bay                        | 4,894   | 8,210   | 1,789   | 10,926  | 10,739  | 8,202   | 19,196  | 24,869  | 6,239   | 11,709    |
| Trinity (purse seine+gillnet)    | 8,820   | 4,512   | 2,526   | 843     | 1,271   | 1,865   | 369     | 595     | 2,014   | 1,355     |
| German Bank                      | 13,576  | 20.556  | 24,660  | 25,631  | 24,139  | 22,355  | 21,573  | 14,175  | 14,171  | 20,958    |
| Spawn Area Total                 | 27,290  | 33,278  | 28,974  | 37,400  | 36,149  | 32,422  | 41,138  | 39,639  | 22,424  | 34,021    |
| Overall SW Nova Catch            | 56,117  | 77.027  | 77,552  | 85,284  | 71,570  | 77,054  | 89,461  | 78,029  | 48,981  | 75,419    |
| C2) Adjusted Catch by Area       | 1997    | 1998    | 1999    | 2000    | 2001    | 2002    | 2003    | 2004    | 2005    | Avg 99-05 |
| Scots Bay                        | 13,015  | 14,293  | 5,725   | 21,914  | 23,330  | 19,782  | 31,996  | 33,444  | 8,155   | 20,621    |
| Trinity                          | 9,986   | 5,080   | 2,899   | 907     | 2,408   | 2,530   | 1,755   | 1,113   | 2,596   | 2,030     |
| German Bank                      | 33,116  | 57,655  | 68,929  | 62,462  | 45,832  | 54,742  | 55,710  | 43,472  | 38,231  | 52,768    |
| Adjusted Catch Total             | 56,117  | 77,027  | 77.552  | 85,284  | 71,570  | 77.054  | 89,461  | 78,029  | 48,981  | 75,419    |
| Overall SW Nova Catch            | 56,117  | 77,027  | 77,552  | 85,284  | 71,570  | 77.054  | 89,461  | 78,029  | 48,981  | 75,419    |
| P1) Percentage (C1/SSB)          | 1997    | 1998    | 1999    | 2000    | 2001    | 2002    | 2003    | 2004    | 2005    | Avg 99-05 |
| Scots Bay                        | 3%      | 11%     | 4%      | 10%     | 7%      | 6%      | 14%     | 23%     | 37%     | 15%       |
| Trinity                          | 38%     | 67%     | 65%     | 136%    | 9%      | 23%     | 3%      | 9%      | 39%     | 41%       |
| German Bank                      | 4%      | 5%      | 5%      | 7%      | 9%      | 6%      | 6%      | 4%      | 7%      | 6%        |
| Overall (C1/SSB)                 | 5%      | 6%      | 6%      | 8%      | 8%      | 6%      | 8%      | 8%      | 10%     | 8%        |
| P2) Percentage adjusted (C2/SSB) | 1997    | 1998    | 1999    | 2000    | 2001    | 2002    | 2003    | 2004    | 2005    | Avg 99-05 |
| Scots Bay                        | 8%      | 20%     | 14%     | 21%     | 14%     | 14%     | 24%     | 31%     | 49%     | 24%       |
| Trinity                          | 43%     | 75%     | 75%     | 146%    | 16%     | 31%     | 12%     | 1796    | 51%     | 50%       |
| German Bank                      | 9%      | 13%     | 15%     | 18%     | 16%     | 14%     | 16%     | 12%     | 18%     | 15%       |
| Overall Adjusted (C2/SSB)        | 10%     | 15%     | 15%     | 18%     | 16%     | 14%     | 18%     | 16%     | 21%     | 17%       |

Table 11. Summary of biological samples by gear and month as collected during the 2005 4VWX herring fisheries. 'NO\_LF' is the number of length frequency samples collected, 'NO\_MEAS' is the number of length frequency fish measured and 'Aged' is the number of detail fish with age determined.

|                           |  | Month |       |       |       |        |        |        |        |       |       |       |             |
|---------------------------|--|-------|-------|-------|-------|--------|--------|--------|--------|-------|-------|-------|-------------|
| Gearname                  | Data   | 1     | 2     | 3     | 5     | 6      | 7      | 8      | 9      | 10    | 11    | 12    | Grand Total |
| 4W Purse Seine            | Sum of No. LF Samples                        |       |       |       | 1     | 23     | 1      |        |        |       |       |       | 25          |
|                           | Sum of No. Measured                          |       |       |       | 158   | 2,939  | 153    |        |        |       |       |       | 3,250       |
|                           | Sum of No. Aged                              |       |       |       |       |        |        |        |        |       |       |       |             |
| 5Y CAN P.Seine            | Sum of No. LF Samples                        |       |       |       |       | 10     | 29     |        | 1      | 9     |       |       | 49          |
|                           | Sum of No. Measured                          |       |       |       |       | 1,085  | 4.243  |        | 118    | 1,049 |       |       | 6,495       |
|                           | Sum of No. Aged                              |       |       |       |       | 57     | 100    |        |        | 136   |       |       | 293         |
| 5Y USA P.Seine/MWT        | Sum of No. LF Samples                        |       |       |       | 5     | 11     |        | 1      | 1      | 2     | 23    | 9     | 52          |
|                           | Sum of No. Measured                          | 1     |       |       | 552   | 1,305  |        | 115    | 124    | 254   | 2,732 | 1.100 | 6,182       |
|                           | Sum of No. Aged                              |       |       |       |       |        |        |        |        |       |       |       | -           |
| 5Z USA P.Seine/MWT        | Sum of No. LF Samples                        | 24    | 40    | 18    |       |        |        |        |        |       | 3     |       | 85          |
| or contractive            | Sum of No. Measured                          | 2.752 | 4.422 | 2.172 |       |        |        |        |        |       | 379   |       | 9,725       |
|                           | Sum of No. Aged                              | 2,702 | .,    |       |       |        |        |        |        |       |       |       | 0,720       |
| Gillnet                   | Sum of No. LF Samples                        |       |       |       |       |        |        |        | 5      | 9     |       |       | 14          |
|                           | Sum of No. Measured                          | 1     |       |       |       |        |        |        | 1.510  | 762   |       |       | 2.272       |
|                           | Sum of No. Aged                              |       |       |       |       |        |        |        | 114    | 44    |       |       | 158         |
| N.B. Purse Seine          | Sum of No. LF Samples                        | 9     |       |       |       | 3      | 26     | 3      | 114    | 8     |       |       | 49          |
| TO.D. I GIGO DENIE        | Sum of No. Measured                          | 600   |       |       |       | 345    | 3.146  | 272    |        | 728   |       |       | 5.091       |
|                           | Sum of No. Aged                              | 122   |       |       |       | 040    | 40     | 21     |        | 76    |       |       | 259         |
| N.B. Shut-off             | Sum of No. LF Samples                        | 100   |       |       |       |        | 70     | 2      | 4      | 10    | 3     |       | 9           |
| 14.B. Shidt-on            | Sum of No. Measured                          | 1     |       |       |       |        |        | 262    | 423    |       | 347   |       | 1.032       |
|                           | Sum of No. Aged                              |       |       |       |       |        |        | 27     | 423    |       | 42    |       | 69          |
| N.B. Weirs                | Sum of No. LF Samples                        | +     |       |       |       | 1      | 38     | 178    | 126    | 25    | 3     |       | 371         |
| N.B. Weirs                | Sum of No. Measured                          |       |       |       |       | 138    | 4.931  | 22.679 | 14.807 | 2.996 | 353   |       | 45,904      |
|                           |  | 1     |       |       |       | 26     | 102    | 356    | 268    | 79    | 20    |       |             |
| N.S. Purse Seine          | Sum of No. Aged                              | -     |       |       | 14    | 66     | 90     | 306    | 91     | 27    | 20    |       | 851<br>368  |
| N.S. Purse Seine          | Sum of No. LF Samples<br>Sum of No. Measured |       |       |       |       |        |        |        | -      |       |       |       | 46,101      |
|                           | Section of the measures                      |       |       |       | 1,736 | 8,066  | 11,274 | 10,153 | 11,592 | 3,280 |       |       |             |
|                           | Sum of No. Aged                              | -     |       |       | 59    | 221    | 244    | 1,068  | 642    | 155   |       |       | 2.389       |
| N.S. Weirs                | Sum of No. LF Samples                        |       |       |       | 1     | 31     | 10     | 11     | 1      |       |       |       | 54          |
|                           | Sum of No. Measured                          |       |       |       | 118   | 3,855  | 1,271  | 1,419  | 111    |       |       |       | 6,774       |
|                           | Sum of No. Aged                              | -     |       |       |       | 253    | 73     | 141    |        |       |       |       | 467         |
| Resrch. Otter Trawl       | Sum of No. LF Samples                        |       | 9     | 30    |       | 15     | 98     |        |        |       |       |       | 152         |
|                           | Sum of No. Measured                          |       |       |       |       |        |        |        |        |       |       |       |             |
|                           | Sum of No. Aged                              | -     | 64    | 275   |       | 151    | 804    |        |        |       |       |       | 1.294       |
| Midwater Trawl            | Sum of No. LF Samples                        |       |       |       |       |        |        |        |        |       | 9     | 3     | 12          |
|                           | Sum of No. Measured                          |       |       |       |       |        |        |        |        |       | 1,817 | 516   | 2,333       |
|                           | Sum of No. Aged                              |       |       |       |       |        |        |        |        |       | 45    |       | 45          |
| Total Sum of No. LF Samp  |  | 33    | 49    | 48    | 21    | 160    | 292    | 275    | 229    | 80    | 41    | 12    | 1,240       |
| Total Sum of No. Measured | d  | 3,352 | 4,422 | 2.172 | 2.564 | 17,733 | 25.018 | 34,900 | 28,685 | 9,069 | 5,628 | 1.616 | 135,159     |
| Total Sum of No. Aged     |  | 122   | 64    | 275   | 59    | 708    | 1,363  | 1,613  | 1.024  | 490   | 107   |       | 5.825       |

Table 12. Number of herring samples collected by DFO personnel from commercial fisheries (Commercial), by members of the fishing industry (Industry), observer program (Observer), independent observers on foreign vessels (OSS) and DFO research surveys (Research).

|         |            | Samp     | le Source |     |          |       |
|---------|------------|----------|-----------|-----|----------|-------|
| Year    | Commercial | Industry | Observer  | oss | Research | Total |
| 1990    | 422        |          |           | 185 |          | 607   |
| 1991    | 448        |          |           | 167 | 1        | 616   |
| 1992    | 330        |          |           | 205 | 1        | 536   |
| 1993    | 183        |          |           | 421 |          | 604   |
| 1994    | 223        |          |           | 228 | 14       | 465   |
| 1995    | 138        |          |           | 244 | 108      | 490   |
| 1996    | 127        | 868      | 49        |     | 69       | 1,113 |
| 1997    | 78         | 1,443    |           |     | 114      | 1,635 |
| 1998    | 225        | 1,376    |           |     | 98       | 1,699 |
| 1999    | 49         | 1,388    | 89        |     | 198      | 1,724 |
| 2000    | 34         | 1,387    | 108       |     | 177      | 1,706 |
| 2001    | 47         | 1,455    | 96        |     | 190      | 1,788 |
| 2002    | 17         | 1,339    | 84        |     | 181      | 1,621 |
| 2003    | 58         | 1,292    | 56        |     | 199      | 1,605 |
| 2004    | 50         | 1,270    | 60        |     | 105      | 1,485 |
| 2005    | 48         | 1,017    | 23        |     | 152      | 1,240 |
| Average | 155        | 1,284    | 71        | 242 | 115      | 1,183 |

Table 13. Agreement in 2005 age determinations between aged and re-aged herring.

|       |   | read2 |    |    |    |    |    |   |   |   |       |
|-------|---|-------|----|----|----|----|----|---|---|---|-------|
| read1 |   |       | 1  | 2  | 3  | 4  | 5  | 6 | 7 | 8 | Total |
|       | 1 |       | 25 |    |    |    |    |   |   |   | 25    |
|       | 2 |       |    | 25 | 1  |    |    |   |   |   | 26    |
|       | 3 |       |    |    | 27 |    |    |   |   |   | 27    |
|       | 4 |       |    |    | 1  | 25 | 1  |   |   |   | 27    |
|       | 5 |       |    |    |    |    | 19 | 2 |   |   | 21    |
|       | 6 |       |    |    |    |    | 2  | 6 | 1 |   | 9     |
|       | 7 |       |    |    |    |    |    | 1 |   | 1 | 2     |
|       | 8 |       |    |    |    |    |    |   |   | 6 | €     |
| Total |   |       | 25 | 25 | 29 | 25 | 22 | 9 | 1 | 7 | 143   |

agreement = 93%

Table 14. Herring catch at age for the 2005 purse seine, gillnet and weir fisheries conducted on the SW Nova Scotia/Bay of Fundy spawning component (4WX stock).

| SW Nova Scotia Stock    | Age 1 | Age 2  | Age 3   | Age 4   | Age 5  | Age 6 | Age 7 | Age 8 | Age 9 | Age 10 | Age 11+ | Total   |
|-------------------------|-------|--------|---------|---------|--------|-------|-------|-------|-------|--------|---------|---------|
| Numbers (x1,000)        | 135   | 72,039 | 171,155 | 180,893 | 28,030 | 4,286 | 1,050 | 49    | 2     | 2      | -       | 457,640 |
| % numbers               | 0%    | 16%    | 37%     | 40%     | 6%     | 1%    | 0%    | 0%    | 0%    | 0%     | 0%      | 100%    |
| Catch wt. (t)           | 3     | 2,502  | 14,250  | 25,487  | 5,366  | 996   | 278   | 15    | 1     | 1      | -       | 48,898  |
| % catch wt.             | 0%    | 5%     | 29%     | 52%     | 11%    | 2%    | 1%    | 0%    | 0%    | 0%     | 0%      | 100%    |
| Avg. len (cm)           | 14.4  | 17.2   | 22.9    | 26.5    | 29.1   | 30.9  | 32.0  | 33.5  | 34.0  | 35.0   |         | 23.9    |
| Avg. wt. (g)            | 19.2  | 34.7   | 83.3    | 140.9   | 191.4  | 232.5 | 264.5 | 306.2 | 321.9 | 364.9  |         | 106.8   |
| Catch Numbers (000's)   | Age 1 | Age 2  | Age 3   | Age 4   | Age 5  | Age 6 | Age 7 | Age 8 | Age 9 | Age 10 | Age 11+ | Total   |
| Fall P. Seine (2004)    | 0     | 226    | 23,464  | 8,251   | 1,200  | 92    | 5     | 2     | 0     | 0      | 0       | 33,241  |
| Winter P. Seine (2005)  | o     | 9,624  | 11,282  | 0       | 0      | 0     | 0     | 0     | 0     | 0      | 0       | 20,906  |
| Summer P. Seine (2005)  | 135   | 53,206 | 127,888 | 162,701 | 25,352 | 3,852 | 924   | 41    | 1     | 1      | 0       | 374,101 |
| Gillnet "Stock"         | 0     | 0      | 95      | 3,347   | 178    | 66    | 3     | 0     | 0     | 0      | 0       | 3,689   |
| N.S. Weirs              | o     | 8.982  | 8,426   | 6,594   | 1,299  | 275   | 119   | 7     | 2     | 0      | o       | 25,703  |
| Total Numbers by Age    | 135   | 72.039 | 171,155 | 180,893 | 28,030 | 4,286 | 1.050 | 49    | 3     | 1      | 0       | 457,640 |
| % Numbers               | Age 1 | Age 2  | Age 3   | Age 4   | Age 5  | Age 6 | Age 7 | Age 8 | Age 9 | Age 10 | Age 11+ | Total   |
| Fall P. Seine (2004)    | 0%    | 1%     | 71%     | 25%     | 4%     | 0%    | 0%    | 0%    | 0%    | 0%     | 0%      | 100%    |
| Winter P. Seine (2005)  | 0%    | 46%    | 54%     | 0%      | 0%     | 0%    | 0%    | 0%    | 0%    | 0%     | 0%      | 100%    |
| Summer P. Seine (2005)  | 0%    | 14%    | 34%     | 43%     | 7%     | 1%    | 0%    | 0%    | 0%    | 0%     | 0%      | 100%    |
| Gillnet "Stock"         | 0%    | 0%     | 3%      | 91%     | 5%     | 2%    | 0%    | 0%    | 0%    | 0%     | 0%      | 100%    |
| N.S. Weirs              | 0%    | 35%    | 33%     | 26%     | 5%     | 1%    | 0%    | 0%    | 0%    | 0%     | 0%      | 100%    |
| Percent Numbers by Age  | 0%    | 16%    | 37%     | 40%     | 6%     | 1%    | 0%    | 0%    | 0%    | 0%     | 0%      | 100%    |
|                         |       |        |         |         |        |       |       |       |       |        |         |         |
| Catch Weight (t)        | Age 1 | Age 2  | Age 3   | Age 4   | Age 5  | Age 6 | Age 7 | Age 8 | Age 9 | Age 10 | Age 11+ | Total   |
| Fall P. Seine (2004)    | 0     | 3      | 1,058   | 797     | 154    | 16    | 1     | 0     | 0     | 0      | 0       | 2,030   |
| Winter P. Seine (2005)  | 0     | 164    | 407     | 0       | 0      | o     | 0     | 0     | 0     | 0      | 0       | 571     |
| Summer P. Seine (2005)  | 3     | 2.069  | 12,106  | 23,233  | 4,921  | 899   | 244   | 13    | 0     | 0      | 0       | 43,487  |
| Gillnet "Stock"         | 0     | 0      | 12      | 504     | 33     | 16    | 1     | 0     | 0     | 0      | 0       | 566     |
| N.S. Weirs              | 0     | 267    | 666     | 953     | 257    | 66    | 32    | 2     | 1     | 0      | 0       | 2,244   |
| Total Weight (t) by Age | 3     | 2,502  | 14,250  | 25,487  | 5,366  | 996   | 278   | 15    | 1     | 0      | 0       | 48,898  |
|                         |       |        |         |         |        |       |       |       |       |        |         |         |
| % Catch Weight          | Age 1 | Age 2  | Age 3   | Age 4   | Age 5  | Age 6 | Age 7 | Age 8 | Age 9 | Age 10 | Age 11+ | Total   |
| Fall P. Seine (2004)    | 0%    | 0%     | 52%     | 39%     | 8%     | 1%    | 0%    | 0%    | 0%    | 0%     | 0%      | 100%    |
| Winter P. Seine (2005)  | 0%    | 29%    | 71%     | 0%      | 0%     | 0%    | 0%    | 0%    | 0%    | 0%     | 0%      | 100%    |
| Summer P. Seine (2005)  | 0%    | 5%     | 28%     | 53%     | 11%    | 2%    | 1%    | 0%    | 0%    | 0%     | 0%      | 100%    |
| Gillnet "Stock"         | 0%    | 0%     | 2%      | 89%     | 6%     | 3%    | 0%    | 0%    | 0%    | 0%     | 0%      | 100%    |
| N.S. Weirs              | 0%    | 12%    | 30%     | 42%     | 11%    | 3%    | 1%    | 0%    | 0%    | 0%     | 0%      | 100%    |
| Percent Weight by Age   | 0%    | 5%     | 29%     | 52%     | 11%    | 2%    | 1%    | 0%    | 0%    | 0%     | 0%      | 100%    |

Table 15. Herring catch at age by NAFO unit area for the 2005 summer purse seine fishery conducted on the SW Nova Scotia/Bay of Fundy spawning component (4WX stock)

| Scotia/Bay of Fundy     |       |        |         | VX stock |              |       |       |        |       |        |         |               |
|-------------------------|-------|--------|---------|----------|--------------|-------|-------|--------|-------|--------|---------|---------------|
| Summer Purse - overall  | Age 1 | Age 2  | Age 3   | Age 4    | Age 5        | Age 6 | Age 7 | Age 8  | Age 9 | Age 10 | Age 11+ | Total         |
| Numbers (x1,000)        | 135   | 53,206 | 127,888 | 162,701  | 25,352       | 3,852 | 924   | 41     | 1     | 1      |         | 374,101       |
| % numbers               | 0%    | 14%    | 34%     | 43%      | 7%           | 1%    | 0%    | 0%     | 0%    | 0%     |         | 100%          |
| Catch wt. (t)           | 3     | 2,069  | 12,106  | 23,233   | 4,921        | 899   | 244   | 13     | 0     | -      |         | 43,487        |
| % catch wt.             | 0%    | 5%     | 28%     | 53%      | 11%          | 2%    | 1%    | 0%     | 0%    | 0%     | - 1     | 100%          |
| Avg. len (cm)           | 14.4  | 17.9   | 23.4    | 26.5     | 29.1         | 30.8  | 32.0  | 33.5   | 35.0  | 35.0   |         | 24.4          |
| Avg. wt. (g)            | 19.2  | 38.9   | 94.7    | 142.8    | 194.1        | 233.3 | 263.7 | 308.8  | 365.5 | 365.5  |         | 116.2         |
| 5Yb Purse               | Age 1 | Age 2  | Age 3   | Age 4    | Age 5        | Age 6 | Age 7 | Age 8  | Age 9 | Age 10 | Age 11+ | Total         |
| Numbers (x1,000)        | -     | 41     | 23,373  | 12,175   | 1,243        | 97    | 6     | -      | -     | -      |         | 36,934        |
| % numbers               | 0%    | 0%     | 63%     | 33%      | 3%           | 0%    | 0%    | 0%     | 0%    | 0%     | i       | 100%          |
| Catch wt. (t)           | -     | 2      | 2,214   | 1,700    | 243          | 23    | 1     | -      |       | -      |         | 4,183         |
| % catch wt.             | 0%    | 0%     | 53%     | 41%      | 6%           | 1%    | 0%    | 0%     | 0%    | 0%     | - 1     | 100%          |
| Avg. len (cm)           | -     | 19.4   | 23.4    | 26.3     | 29.1         | 30.7  | 31.6  | -      |       | -      |         | 24.6          |
| Avg. wt. (q)            | -     | 50.2   | 94.7    | 139.6    | 195.5        | 234.8 | 258.3 | -      | -     |        |         | 113.3         |
| 4Xs Purse               | Age 1 | Age 2  | Age 3   | Age 4    | A== 5        | A e   | Age 7 | A == 0 | 4 0   | 4 40   | 4 44-1  |               |
| Numbers (x1,000)        | 42    | 598    | 14,561  | 7,759    | Age 5<br>555 | Age 6 | Age / | Age 8  | Age 9 | Age 10 | Age 11+ | Total         |
| % numbers               | 0%    | 3%     | 62%     | 33%      | 2%           | 1%    | 0%    | 0%     | 0%    | 0%     | 1       | 23,641        |
| Catch wt. (t)           | 1     | 25     | 1,385   | 1,056    | 108          | 29    | 1     | 0%     | 076   | 0%     |         | 100%          |
| % catch wt.             | 0%    | 1%     | 53%     | 41%      | 4%           | 1%    | 0%    | 0%     | 0%    | 0%     |         | 2,604         |
| Avg. len (cm)           | 13.2  | 18.3   | 23.4    | 26.1     | 29.0         | 30.9  | 32.0  | 0%     | 076   | 0%     |         | 100%          |
| Avg. wt. (a)            | 14.3  | 41.4   | 95.1    | 136.1    | 194.3        | 236.4 | 270.6 |        |       |        |         | 24.3<br>110.1 |
|                         |       |        |         |          |              |       |       |        |       |        |         |               |
| 4Xr Purse               | Age 1 | Age 2  | Age 3   | Age 4    | Age 5        | Age 6 | Age 7 | Age 8  | Age 9 | Age 10 | Age 11+ | Total         |
| Numbers (x1,000)        | 92    | 49,236 | 47,464  | 45,108   | 5,546        | 1,006 | 211   | 12     | -     | -      |         | 148,676       |
| % numbers               | 0%    | 33%    | 32%     | 30%      | 4%           | 1%    | 0%    | 0%     | 0%    | 0%     |         | 100%          |
| Catch wt. (t)           | 2     | 1,883  | 4,190   | 6,252    | 1,090        | 237   | 57    | 4      | .     | -      |         | 13,714        |
| % catch wt.             | 0%    | 14%    | 31%     | 46%      | 8%           | 2%    | 0%    | 0%     | 0%    | 0%     |         | 100%          |
| Avg. len (cm)           | 15.0  | 17.8   | 22.9    | 26.3     | 29.2         | 30.8  | 32.1  | 33.1   | -     | - 1    |         | 22.5          |
| Avg. wt. (g)            | 21.5  | 38.2   | 88.3    | 138.6    | 196.6        | 235.3 | 269.8 | 304.5  | -     | -      |         | 92.2          |
| 4Xqpo Stock Purse Seine | Age 1 | Age 2  | Age 3   | Age 4    | Age 5        | Age 6 | Age 7 | Age 8  | Age 9 | Age 10 | Age 11+ | Total         |
| Numbers (x1,000)        |       | 3,331  | 42,490  | 97.659   | 18.008       | 2,629 | 703   | 29     | 1     | 1      |         | 164,850       |
| % numbers               | 0%    | 2%     | 26%     | 59%      | 11%          | 2%    | 0%    | 0%     | 0%    | 0%     |         | 100%          |
| Catch wt. (t)           |       | 159    | 4,317   | 14,225   | 3.480        | 611   | 184   | 9      | 0     | 0      |         | 22,986        |
| % catch wt.             | 0%    | 1%     | 19%     | 62%      | 15%          | 3%    | 1%    | 0%     | 0%    | 0%     |         | 100%          |
| Avg. len (cm)           |       | 19.1   | 23.9    | 26.7     | 29.1         | 30.9  | 32.0  | 33.6   | 35.0  | 35.0   |         | 26.2          |
| Avg. wt. (g)            | -     | 47.8   | 101.6   | 145.7    | 193.2        | 232.3 | 261.9 | 310.5  | 365.5 | 365.5  |         | 139.4         |

Table 16. Herring catch at age by month for the 2005 summer purse seine fishery conducted on the SW Nova Scotia/Bay of Fundy spawning component (4WX stock)

| May - P. Seine               | Age 1 | Age 2  | Age 3  | Age 4  | Age 5 | Age 6 | Age 7 | Age 8 | Age 9 | Age 10 | Age 11+ | Tota    |
|------------------------------|-------|--------|--------|--------|-------|-------|-------|-------|-------|--------|---------|---------|
| Numbers (x1,000)             | -     | 903    | 14,002 | 2,787  | 214   | 21    | 3     |       |       |        | -       | 17,930  |
| % numbers                    | 0%    | 5%     | 78%    | 16%    | 196   | 0%    | 0%    | 0%    | 0%    | 0%     | 0%      | 1009    |
| Catch wt. (t)                |       | 37     | 1,007  | 356    | 39    | 5     | 1     |       |       |        |         | 1,44    |
| % catch wt.                  | 0%    | 3%     | 70%    | 25%    | 3%    | 0%    | 0%    | 0%    | 0%    | 0%     | 0%      | 100%    |
| Avg. len (cm)                |       | 18.4   | 22.0   | 26.1   | 29.0  | 31.2  | 31.5  |       |       | -      | -       | 22.5    |
| Avg. wt. (g)                 | .     | 41.0   | 71.9   | 127.9  | 180.9 | 231.2 | 240.0 | -     | .     |        |         | 80.6    |
| June - P. Seine              | Age 1 | Age 2  | Age 3  | Age 4  | Age 5 | Age 6 | Age 7 | Age 8 | Age 9 | Age 10 | Age 11+ | Tota    |
| Numbers (x1,000)             |       | 4,081  | 15,255 | 7,468  | 1,512 | 245   | 78    | 4     | 2     |        | . 1     | 28.643  |
| % numbers                    | 0%    | 14%    | 53%    | 26%    | 5%    | 1%    | 0%    | 0%    | 0%    | 0%     | 0%      | 100%    |
| Catch wt. (t)                |       | 115    | 1,274  | 1.050  | 301   | 60    | 22    | 1     | 1     |        | -       | 2.82    |
| % catch wt.                  | 0%    | 4%     | 45%    | 37%    | 11%   | 2%    | 1%    | 0%    | 0%    | 0%     | 0%      | 100%    |
| Avg. len (cm)                |       | 16.4   | 22.6   | 26.5   | 29.3  | 31.1  | 32.2  | 33.5  | 35.0  |        | 0.76    | 23.2    |
| Avg. wt. (g)                 |       | 28.1   | 83.5   | 140.6  | 199.1 | 244.0 | 275.3 | 314.3 | 365.5 |        |         | 98.6    |
| July - P. Seine              | Age 1 | Age 2  | Age 3  | Age 4  | Age 5 | Age 6 | Age 7 | Age 8 | Age 9 | Age 10 | Age 11+ | Tota    |
| Numbers (x1,000)             | -     | 51     | 53,612 | 51.505 | 4.991 | 364   | 93    | 9     |       |        | -       | 110,624 |
| % numbers                    | 0%    | 0%     | 48%    | 47%    | 5%    | 0%    | 0%    | 0%    | 0%    | 0%     | 0%      | 100%    |
| Catch wt. (t)                | -     | 2      | 5.277  | 7.385  | 965   | 87    | 26    | 3     |       |        | - "     | 13,745  |
| % catch wt.                  | 0%    | 0%     | 38%    | 54%    | 7%    | 1%    | 0%    | 0%    | 0%    | 0%     | 0%      | 100%    |
| Avg. len (cm)                |       | 19.2   | 23.6   | 26.4   | 28.9  | 30.8  | 32.1  | 33.0  |       |        | 0.00    | 25.2    |
| Ava. wt. (a)                 |       | 48.7   | 98.4   | 143.4  | 193.4 | 239.8 | 276.9 | 302.4 | .     |        |         | 124.2   |
| Aug - P. Seine               | Age 1 | Age 2  | Age 3  | Age 4  | Age 5 | Age 6 | Age 7 | Age 8 | Age 9 | Age 10 | Age 11+ | Tota    |
| Numbers (x1,000)             | -     | 484    | 17,887 | 42.330 | 4.617 | 648   | 84    | 2     |       |        | -       | 66,051  |
| % numbers                    | 0%    | 1%     | 27%    | 64%    | 7%    | 1%    | 0%    | 0%    | 0%    | 0%     | 0%      | 100%    |
| Catch wt. (t)                |       | 20     | 1.857  | 6.009  | 893   | 150   | 22    | 0     |       |        |         | 8.952   |
| % catch wt.                  | 0%    | 0%     | 21%    | 67%    | 10%   | 2%    | 0%    | 0%    | 0%    | 0%     | 0%      | 1.0     |
| Avg. len (cm)                |       | 18.1   | 24.0   | 26.4   | 29.1  | 30.7  | 32.0  | 33.0  |       |        | 0,00    | 25.9    |
| Ava. wt. (a)                 | -     | 41.7   | 103.8  | 142.0  | 193.4 | 232.0 | 263.3 | 292.3 |       |        |         | 135.5   |
| Sept - P. Seine              | Age 1 | Age 2  | Age 3  | Age 4  | Age 5 | Age 6 | Age 7 | Age 8 | Age 9 | Age 10 | Age 11+ | Tota    |
| Numbers (x1,000)             | -     | 15,494 | 14,582 | 43.493 | 8.718 | 1.530 | 520   | 21    |       |        |         | 84,359  |
| % numbers                    | 0%    | 18%    | 17%    | 52%    | 10%   | 2%    | 196   | 0%    | 0%    | 0%     | 0%      | 100%    |
| Catch wt. (t)                | -     | 620    | 1,434  | 6,238  | 1,705 | 357   | 137   | 7     |       | - 7    |         | 10.498  |
| % catch wt.                  | 0%    | 6%     | 14%    | 59%    | 18%   | 3%    | 1%    | 0%    | 0%    | 0%     | 0%      | 100%    |
| Avg. len (cm)                |       | 18.0   | 23.6   | 26.6   | 29.2  | 30.8  | 32.0  | 33.8  |       | - 70   | 0.0     | 24.9    |
| Avg. wt. (q)                 | - 1   | 40.0   | 98.4   | 143.4  | 195.5 | 233.5 | 263.2 | 317.3 |       |        |         | 124.4   |
| Oct - P. Seine               | Age 1 | Age 2  | Age 3  | Age 4  | Age 5 | Age 6 | Age 7 | Age 8 | Age 9 | Age 10 | Age 11+ | Total   |
| Numbers (x1,000)             | 135   | 32,194 | 12.551 | 15,118 | 5.300 | 1.044 | 147   | 5     |       |        |         | 66,494  |
| % numbers                    | 0%    | 48%    | 19%    | 23%    | 8%    | 2%    | 0%    | 0%    | 0%    | 0%     | 0%      | 100%    |
| Catch wt. (t)                | 3     | 1,274  | 1.257  | 2.195  | 1.019 | 239   | 37    | 1     | 0,0   |        | 0.00    | 6.024   |
|                              | 0%    | 21%    | 21%    | 36%    | 17%   | 4%    | 1%    | 0%    | 0%    | 0%     | 0%      | 100%    |
| % catch wt.                  | 0.764 |        |        |        |       |       |       |       |       |        |         |         |
| % catch wt.<br>Avg. len (cm) | 14.4  | 18.0   | 23.9   | 26.8   | 29.3  | 30.9  | 31.8  | 33.0  | 078   | 076    | 0%      | 22.2    |

Table 17. Herring catch at age by fishing ground for the 2005 summer purse seine fishery conducted on the SW Nova Scotia/Bay of Fundy spawning component (4WX stock).

| Fishing Ground    | Data Type        | Age 1 | Age 2  | Age 3  | Age 4  | Age 5  | Age 6 | Age 7 | Age 8 | Age 9 | Age 10 | Total   |
|-------------------|------------------|-------|--------|--------|--------|--------|-------|-------|-------|-------|--------|---------|
| Gannet.Dry Ledge  | Numbers (x1,000) | -     | 469    | 12,640 | 11,619 | 1,658  | 169   | 38    |       | *     | *      | 26,593  |
| German Bank       | Numbers (x1,000) |       | 2,480  | 19,859 | 58,701 | 13,499 | 2,425 | 644   | 33    |       | -      | 97,641  |
| Grand Manan       | Numbers (x1,000) | .     | 32     | 34,551 | 15,410 | 1,480  | 113   | 22    |       |       | -      | 51,608  |
| Long Island       | Numbers (x1,000) | 92    | 54,542 | 37,996 | 15,438 | 1,749  | 397   | 165   | 11    | *     | -      | 110,391 |
| Lurcher           | Numbers (x1,000) |       | 902    | 2,706  | 8,385  | 1,540  | 127   | 87    | 1     | 1     | - 1    | 13,748  |
| NB Coastal        | Numbers (x1,000) | 46    | 644    | 470    | 219    | 21     |       |       |       |       | -      | 1,400   |
| Scots Bay         | Numbers (x1,000) | -     | 3      | 10,215 | 29,246 | 3,968  | 649   | 125   |       | *     | - 1    | 44,206  |
| Seal Island       | Numbers (x1,000) |       |        | 2,582  | 6.331  | 545    | 18    | 4     |       |       | -      | 9.480   |
| SW Grounds        | Numbers (x1,000) | -     | 12     | 4,143  | 5,326  | 282    | 11    | 3     |       |       |        | 9,777   |
| Trinity Ledge     | Numbers (x1,000) | - 1   | -      | 1.651  | 7,497  | 705    | 18    | 3     | -     | -     | -      | 9.874   |
| Yankee Bank       | Numbers (x1,000) | -     |        | 1,752  | 2.376  | 74     | 11    | 17    | *     |       | -      | 4,230   |
| Gannet, Dry Ledge | Catch wt. (t)    | -     | 23     | 1,130  | 1,656  | 322    | 40    | 10    | *     |       |        | 3,181   |
| German Bank       | Catch wt. (t)    | -     | 121    | 2,128  | 8,560  | 2,614  | 564   | 167   | 10    | -     | -      | 14,164  |
| Grand Manan       | Catch wt. (t)    |       | 2      | 3,253  | 2,117  | 291    | 27    | 6     |       |       |        | 5,696   |
| Long Island       | Catch wt. (t)    | 2     | 2.095  | 3,076  | 2,069  | 345    | 94    | 44    | 3     | -     |        | 7,728   |
| Lurcher           | Catch wt. (t)    | - 1   | 38     | 258    | 1,229  | 295    | 30    | 23    | 0     | 0     |        | 1,874   |
| NB Coastal        | Catch wt. (t)    | 1     | 27     | 43     | 30     | 4      |       |       |       |       | - 1    | 104     |
| Scots Bay         | Catch wt. (t)    |       | 0      | 1,175  | 4,101  | 779    | 151   | 34    |       |       |        | 6,239   |
| Seal Island       | Catch wt. (t)    | - 1   | -      | 284    | 916    | 104    | 4     | 1     | -     | -     |        | 1,310   |
| SW Grounds        | Catch wt. (t)    |       | 1      | 423    | 747    | 54     | 2     | 1     |       | -     |        | 1,228   |
| Trinity Ledge     | Catch wt. (t)    |       |        | 190    | 1,111  | 132    | 4     | 1     |       |       |        | 1,438   |
| Yankee Bank       | Catch wt. (t)    |       | -      | 182    | 322    | 14     | 3     | 4     |       |       |        | 525     |
| Gannet, Dry Ledge | % catch wt.      | 0%    | 1%     | 36%    | 52%    | 10%    | 1%    | 0%    | 0%    | 0%    | 0%     | 100%    |
| German Bank       | % catch wt.      | 0%    | 1%     | 15%    | 60%    | 18%    | 4%    | 1%    | 0%    | 0%    | 0%     | 100%    |
| Grand Manan       | % catch wt.      | 0%    | 0%     | 57%    | 37%    | 5%     | 0%    | 0%    | 0%    | 0%    | 0%     | 100%    |
| Long Island       | % catch wt.      | 0%    | 27%    | 40%    | 27%    | 4%     | 1%    | 1%    | 0%    | 0%    | 0%     | 100%    |
| Lurcher           | % catch wt.      | 0%    | 2%     | 14%    | 66%    | 16%    | 2%    | 1%    | 0%    | 0%    | 0%     | 100%    |
| NB Coastal        | % catch wt.      | 1%    | 26%    | 41%    | 28%    | 4%     | 0%    | 0%    | 0%    | 0%    |        | 100%    |
| Scots Bay         | % catch wt.      | 0%    | 0%     | 19%    | 66%    | 12%    | 2%    | 1%    | 0%    | 0%    | 0%     | 100%    |
| Seal Island       | % catch wt.      | 0%    | 0%     | 22%    | 70%    | 8%     | 0%    | 0%    | 0%    | 0%    | 0%     | 100%    |
| SW Grounds        | % catch wt.      | 0%    | 0%     | 34%    | 61%    | 4%     | 0%    | 0%    | 0%    | 0%    |        | 100%    |
| Trinity Ledge     | % catch wt.      | 0%    | 0%     | 13%    | 77%    | 9%     | 0%    | 0%    | 0%    | 0%    |        | 100%    |
| Yankee Bank       | % catch wt.      | 0%    | 0%     | 35%    | 61%    | 3%     | 1%    | 1%    | 0%    | 0%    |        | 100%    |
| Gannet, Dry Ledge | % numbers        | 0%    | 2%     | 48%    | 44%    | 6%     | 1%    | 0%    | 0%    | 0%    | 0%     | 100%    |
| German Bank       | % numbers        | 0%    | 3%     | 20%    | 60%    | 14%    | 2%    | 1%    | 0%    | 0%    | 0%     | 100%    |
| Grand Manan       | % numbers        | 0%    | 0%     | 67%    | 30%    | 3%     | 0%    | 0%    | 0%    | 0%    |        | 100%    |
| Long Island       | % numbers        | 0%    | 49%    | 34%    | 1496   | 2%     | 0%    | 0%    | 0%    | 0%    | 0%     | 100%    |
| Lurcher           | % numbers        | 0%    | 7%     | 20%    | 61%    | 11%    | 1%    | 1%    | 0%    | 0%    | 0%     | 100%    |
| NB Coastal        | % numbers        | 3%    | 46%    | 34%    | 16%    | 2%     | 0%    | 0%    | 0%    | 0%    | 0%     | 100%    |
| Scots Bay         | % numbers        | 0%    | 0%     | 23%    | 66%    | 9%     | 1%    | 0%    | 0%    | 0%    | 0%     | 100%    |
| Seal Island       | % numbers        | 0%    | 0%     | 27%    | 67%    | 6%     | 0%    |       | 0%    | 0%    | 0%     | 100%    |
| SW Grounds        | % numbers        | 0%    | 0%     | 42%    | 54%    |        |       |       |       | 0%    | 0%     | 100%    |
| Trinity Ledge     | % numbers        | 0%    | 0%     | 17%    | 76%    |        | 0%    | 0%    |       | 0%    |        | 100%    |
| Yankee Bank       | % numbers        | 0%    | 0%     | 41%    | 56%    |        | 0%    | 0%    | 0%    | 0%    |        | 100%    |

Table 18. Catch at age (thousands) for the SW Nova Scotia / Bay of Fundy herring spawning component, 1965-2005.

|          |        |        |        |         |         | Age     |         |         |         |           |         |      |
|----------|--------|--------|--------|---------|---------|---------|---------|---------|---------|-----------|---------|------|
| Tot      | 11+    | 10     | 9      | 8       | 7       | 6       | 5       | 4       | 3       | 2         | 1       | Year |
| 1,687,17 | 1      | 37     | 54     | 561     | 1.693   | 10,592  | 49,925  | 234,383 | 34,835  | 1,084,719 | 270.378 | 1965 |
| 1,982,10 | 1      | 215    | 1,690  | 7.722   | 13,970  | 45,916  | 321,857 | 73,382  | 448,940 | 914,093   | 154,323 | 1966 |
| 2,088,8  | 148    | 296    | 409    | 4,497   | 57,948  | 159,203 | 110,051 | 266,454 | 153,626 | 613,970   | 722,208 | 1967 |
| 3,370,07 | 1,175  | 5,668  | 15.441 | 31,977  | 90,617  | 73.087  | 290,285 | 83,109  | 224,956 | 2,389,061 | 164,703 | 1968 |
| 1,433,26 | 722    | 2,693  | 6,345  | 22,595  | 62,506  | 112,631 | 162,439 | 132,319 | 531,812 | 290.329   | 108,875 | 1969 |
| 2,145,09 | 2,674  | 7,039  | 21,271 | 41,257  | 111,937 | 120,280 | 201,215 | 286,278 | 76,532  | 576,896   | 699,720 | 1970 |
| 1,164,97 | 5,695  | 7,536  | 36,618 | 50,022  | 93,620  | 75,593  | 113,566 | 106,630 | 183,896 | 404,224   | 87,570  | 1971 |
| 1,171,63 | 11,679 | 13,792 | 26,055 | 48,700  | 49,065  | 75,384  | 77,207  | 148,516 | 71,984  | 649.254   |         | 1972 |
| 1.242.02 | 13,386 | 11,630 | 23,871 | 20,249  | 22.046  | 30.334  | 40,128  | 130,851 | 781,061 | 167,454   | 1,018   | 1973 |
| 1,814,81 | 9.031  | 7,102  | 12,786 | 6.565   | 10,232  | 19,093  | 68,276  | 803,651 | 93,606  | 766,064   | 18,411  | 1974 |
| 1,297,73 | 6,225  | 3,847  | 4,778  | 4,409   | 12,298  | 66,302  | 514,605 | 124,599 | 239,827 | 317,641   | 3,199   | 1975 |
| 790.28   | 3,446  | 2,059  | 3,951  | 5,571   | 21,460  | 268.839 | 68,804  | 153,782 | 206.535 | 55,596    | 240     | 1976 |
| 775.25   | 3,894  | 1,415  | 3,170  | 13,977  | 177,247 | 51,173  | 119,234 | 218,478 | 31.572  | 153,921   | 1,170   | 1977 |
| 818,54   | 1,676  | 2,425  | 11,082 | 108,975 | 31,088  | 68,410  | 122,108 | 12,906  | 40,887  | 383,611   | 35,381  | 1978 |
| 596.32   | 2,411  | 4.527  | 41,389 | 11,836  | 18,255  | 23,142  | 5,430   | 54,620  | 250,393 | 183,982   | 342     | 1979 |
| 629,37   | 2,739  | 10,641 | 2.985  | 6,560   | 4.692   | 4.373   | 27.930  | 474,091 | 80,518  | 12,503    | 2,339   | 1980 |
| 750.92   | 2,149  | 538    | 1,917  | 2.767   | 2.418   | 32.978  | 451,482 | 102.743 | 50,883  | 103.051   |         | 1981 |
| 608.70   | 1,014  | 1,250  | 1.354  | 2,080   | 14.627  | 211.043 | 98,206  | 22,640  | 150.764 | 102,133   | 3.589   | 1982 |
| 780,69   | 1.324  | 642    | 1,728  | 10.352  | 89,982  | 60,678  | 24.483  | 244,007 | 150,328 | 191,682   | 5,488   | 1983 |
| 795.79   | 9,000  | 2,183  | 9.515  | 28,299  | 21.654  | 22,716  | 146,096 | 224.354 | 243.542 | 88,433    |         | 1984 |
| 1,098,13 | 470    | 1,201  | 7,997  | 18.178  | 14,075  | 42,404  | 147,670 | 302,782 | 337,591 | 216,740   | 9,022   | 1985 |
| 802.33   | 349    | 1,356  | 2.942  | 4,320   | 10,770  | 31,599  | 56.937  | 292,792 | 275,903 | 125,300   | 63      | 1986 |
| 1,061,55 | 650    | 3,120  | 3,361  | 7,292   | 19,481  | 45.933  | 242,597 | 527,443 | 126,436 | 82,940    | 2.300   | 1987 |
| 1,201,70 | 2.845  | 3,797  | 4.186  | 21,208  | 42,533  | 236.089 | 434,192 | 195,096 | 113,208 | 148,399   | 151     | 1988 |
| 636,33   | 3,057  | 3.814  | 8.270  | 18,303  | 76,684  | 169,023 | 79,451  | 61,842  | 114,095 | 101.788   | 8       | 1989 |
| 1,038,83 | 6.848  | 10,572 | 31.466 | 116,788 | 201,901 | 101.066 | 89,922  | 171,560 | 130,176 | 178.532   |         | 1990 |
| 798,29   | 13.524 | 18,291 | 45,516 | 80,732  | 50,380  | 41,352  | 88.431  | 183,647 | 179,463 | 96,960    |         | 1991 |
| 974.29   | 20.653 | 34,558 | 59,136 | 35,369  | 34,458  | 75.473  | 126,510 | 286.923 | 132,642 | 168,561   | 9       | 1992 |
| 622.00   | 11,175 | 20.684 | 21.893 | 21,481  | 33.820  | 67.708  | 130,713 | 194,198 | 43,766  | 76,405    | 166     | 1993 |
| 576,15   | 15,533 | 10,447 | 8,706  | 14.889  | 36,059  | 72,512  | 118,015 | 53,700  | 142,260 | 103,885   | 151     | 1994 |
| 559,83   | 3,566  | 2.957  | 4,217  | 6.474   | 22,127  | 36.402  | 36.784  | 112.245 | 219,777 | 113,457   | 1.831   | 1995 |
| 419.81   | 1,605  | 1,310  | 1.782  | 3,300   | 9.151   | 16.862  | 54,534  | 256.063 | 37.715  | 37,496    |         | 1996 |
| 383,54   | 874    | 620    | 894    | 3.636   | 5.131   | 18,917  | 131.062 | 78,098  | 87,395  | 56.561    | 356     | 1997 |
| 688,59   | 398    | 1.288  | 1,730  | 3,856   | 20.679  | 97,464  | 97,065  | 138,751 | 62,322  | 264,901   | 137     | 1998 |
| 686,4    | 13     | 70     | 212    | 613     | 10,044  | 57,291  | 131,463 | 147,840 | 223,283 | 112,893   | 2.694   | 1999 |
| 764,23   | 23     | 33     | 251    | 4.454   | 25.829  | 60.754  | 124.083 | 108,560 | 75,330  | 364,078   | 841     | 2000 |
| 566,19   | 4      | 8      | 304    | 2,203   | 15,509  | 31.891  | 60,409  | 57,175  | 325,273 | 73.368    | 51      | 2001 |
| 746.18   | 3      | 23     | 70     | 1,577   | 12.846  | 27,973  | 75,258  | 210,620 | 98.597  | 303.723   | 15,500  | 2002 |
| 1.061.79 | -      | -      | 23     | 435     | 7,136   | 13,111  | 96,847  | 114.850 | 342.592 | 486,345   | 459     | 2003 |
| 896.87   |        | 1      | 36     | 339     | 3,226   | 9.351   | 79.884  | 132,570 | 347,693 | 320,628   | 3,142   | 2004 |
| 457.64   |        | 2      | 2      | 49      | 1.050   | 4.286   | 28.030  | 180.893 | 171.155 | 72.039    | 135     | 2005 |

Table 19. Catch at age (%) for the SW Nova Scotia / Bay of Fundy herring spawning component, 1965-2005.

|      |    |    |    |    | Age |     |    |    |   |    |     |      |
|------|----|----|----|----|-----|-----|----|----|---|----|-----|------|
| Year | 1  | 2  | 3  | 4  | 5   | 6   | 7  | 8  | 9 | 10 | 11+ | Tota |
| 1965 | 16 | 64 | 2  | 14 | 3   | 1   | 0  | 0  | 0 | 0  | 0   | 100  |
| 1966 | 8  | 46 | 23 | 4  | 16  | - 2 | 1  | 0  | 0 | 0  | 0   | 100  |
| 1967 | 35 | 29 | 7  | 13 | 5   | 8   | 3  | 0  | 0 | 0  | 0   | 100  |
| 1968 | 5  | 71 | 7  | 2  | 9   | 2   | 3  | 1  | 0 | 0  | 0   | 100  |
| 1969 | 8  | 20 | 37 | 9  | 11  | 8   | 4  | 2  | 0 | 0  | 0   | 100  |
| 1970 | 33 | 27 | 4  | 13 | 9   | 6   | 5  | 2  | 1 | 0  | 0   | 100  |
| 1971 | 8  | 35 | 16 | 9  | 10  | 6   | 8  | 4  | 3 | 1  | 0   | 100  |
| 1972 |    | 55 | 6  | 13 | 7   | 6   | 4  | 4  | 2 | 1  | 1   | 100  |
| 1973 | 0  | 13 | 63 | 11 | 3   | 2   | 2  | 2  | 2 | 1  | 1   | 100  |
| 1974 | 1  | 42 | 5  | 44 | 4   | 1   | 1  | 0  | 1 | 0  | 0   | 100  |
| 1975 | 0  | 24 | 18 | 10 | 40  | 5   | 1  | 0  | 0 | 0  | 0   | 100  |
| 1976 | 0  | 7  | 26 | 19 | 9   | 34  | 3  | 1  | 0 | 0  | 0   | 100  |
| 1977 | 0  | 20 | 4  | 28 | 15  | 7   | 23 | 2  | 0 | 0  | 1   | 100  |
| 1978 | 4  | 47 | 5  | 2  | 15  | 8   | 4  | 13 | 1 | 0  | 0   | 100  |
| 1979 | 0  | 31 | 42 | 9  | 1   | 4   | 3  | 2  | 7 | 1  | 0   | 100  |
| 1980 | 0  | 2  | 13 | 75 | 4   | 1   | 1  | 1  | 0 | 2  | 0   | 100  |
| 1981 |    | 14 | 7  | 14 | 60  | 4   | 0  | 0  | 0 | 0  | 0   | 100  |
| 1982 | 1  | 17 | 25 | 4  | 16  | 35  | 2  | 0  | 0 | 0  | 0   | 100  |
| 1983 | 1  | 25 | 19 | 31 | 3   | 8   | 12 | 1  | 0 | 0  | 0   | 100  |
| 1984 |    | 11 | 31 | 28 | 18  | 3   | 3  | 4  | 1 | 0  | 1   | 100  |
| 1985 | 1  | 20 | 31 | 28 | 13  | 4   | 1  | 2  | 1 | 0  | 0   | 100  |
| 1986 | 0  | 16 | 34 | 36 | 7   | 4   | 1  | 1  | 0 | 0  | 0   | 100  |
| 1987 | 0  | 8  | 12 | 50 | 23  | 4   | 2  | 1  | 0 | 0  | 0   | 100  |
| 1988 | 0  | 12 | 9  | 16 | 36  | 20  | 4  | 2  | 0 | 0  | 0   | 100  |
| 1989 | 0  | 16 | 18 | 10 | 12  | 27  | 12 | 3  | 1 | 1  | 0   | 100  |
| 1990 |    | 17 | 13 | 17 | 9   | 10  | 19 | 11 | 3 | 1  | 1   | 100  |
| 1991 |    | 12 | 22 | 23 | 11  | 5   | 6  | 10 | 6 | 2  | 2   | 100  |
| 1992 | 0  | 17 | 14 | 29 | 13  | 8   | 4  | 4  | 6 | 4  | 2   | 100  |
| 1993 | 0  | 12 | 7  | 31 | 21  | 11  | 5  | 3  | 4 | 3  | 2   | 100  |
| 1994 | 0  | 18 | 25 | 9  | 20  | 13  | 6  | 3  | 2 | 2  | 3   | 100  |
| 1995 | 0  | 20 | 39 | 20 | 7   | 7   | 4  | 1  | 1 | 1  | 1   | 100  |
| 1996 |    | 9  | 9  | 61 | 13  | 4   | 2  | 1  | 0 | 0  | 0   | 100  |
| 1997 | 0  | 15 | 23 | 20 | 34  | 5   | 1  | 1  | 0 | 0  | 0   | 100  |
| 1998 | 0  | 38 | 9  | 20 | 14  | 14  | 3  | 1  | 0 | 0  | 0   | 100  |
| 1999 | 0  | 16 | 33 | 22 | 19  | 8   | 1  | 0  | 0 | 0  | 0   | 100  |
| 2000 | 0  | 48 | 10 | 14 | 16  | 8   | 3  | 1  | 0 | 0  | 0   | 100  |
| 2001 | 0  | 13 | 57 | 10 | 11  | 6   | 3  | 0  | 0 | 0  | 0   | 100  |
| 2002 | 2  | 41 | 13 | 28 | 10  | 4   | 2  | 0  | 0 | 0  | 0   | 100  |
| 2003 | 0  | 46 | 32 | 11 | 9   | 1   | 1  | 0  | 0 |    |     | 100  |
| 2004 | 0  | 36 | 39 | 15 | 9   | 1   | 0  | 0  | 0 | 0  |     | 100  |
| 2005 | 0  | 16 | 37 | 40 | 6   | 1   | 0  | 0  | 0 | 0  |     | 100  |

Table 20. Average weights at age (g) for the SW Nova Scotia/Bay of Fundy component of the 4WX herring fishery (weighted by fishery) for 1965-2005 (values for 1979-83 are averages for the period 1968-78 as in Iles et al. 1984).

|      |    |    |     |     | Age |     |     |     |     |    |
|------|----|----|-----|-----|-----|-----|-----|-----|-----|----|
| Year | 1  | 2  | 3   | 4   | 5   | 6   | 7   | - 6 | 9   | 1  |
| 1965 | 10 | 41 | 112 | 172 | 218 | 254 | 286 | 323 | 354 | 38 |
| 1966 | 10 | 41 | 112 | 172 | 218 | 254 | 286 | 323 | 354 | 38 |
| 1967 | 10 | 41 | 112 | 172 | 218 | 254 | 286 | 323 | 354 | 38 |
| 1968 | 10 | 33 | 112 | 148 | 185 | 244 | 276 | 399 | 338 | 41 |
| 1969 | 10 | 37 | 105 | 162 | 207 | 242 | 282 | 306 | 334 | 39 |
| 1970 | 10 | 32 | 119 | 169 | 211 | 257 | 292 | 332 | 369 | 38 |
| 1971 | 10 | 66 | 143 | 199 | 230 | 254 | 293 | 329 | 362 | 38 |
| 1972 | 10 | 44 | 138 | 192 | 223 | 262 | 292 | 322 | 345 | 38 |
| 1973 | 10 | 29 | 106 | 143 | 225 | 252 | 279 | 331 | 360 | 38 |
| 1974 | 10 | 48 | 110 | 175 | 206 | 240 | 277 | 322 | 342 | 35 |
| 1975 | 10 | 21 | 94  | 179 | 216 | 240 | 268 | 333 | 358 | 37 |
| 1976 | 10 | 33 | 114 | 159 | 233 | 249 | 277 | 317 | 382 | 40 |
| 1977 | 10 | 65 | 113 | 174 | 214 | 274 | 293 | 325 | 328 | 41 |
| 1978 | 10 | 28 | 112 | 181 | 229 | 259 | 302 | 330 | 351 | 39 |
| 1979 | 10 | 41 | 112 | 172 | 218 | 254 | 286 | 323 | 354 | 38 |
| 1980 | 10 | 41 | 112 | 172 | 218 | 254 | 286 | 323 | 354 | 38 |
| 1981 | 10 | 41 | 112 | 172 | 218 | 254 | 286 | 323 | 354 | 38 |
| 1982 | 10 | 41 | 112 | 172 | 218 | 254 | 286 | 323 | 354 | 38 |
| 1983 | 10 | 41 | 112 | 172 | 218 | 254 | 286 | 323 | 354 | 38 |
| 1984 | 10 | 38 | 132 | 191 | 229 | 259 | 280 | 296 | 309 | 36 |
| 1985 | 10 | 53 | 118 | 204 | 249 | 278 | 315 | 334 | 344 | 44 |
| 1986 | 10 | 55 | 124 | 182 | 239 | 271 | 306 | 329 | 360 | 40 |
| 1987 | 12 | 50 | 98  | 153 | 199 | 245 | 274 | 290 | 318 | 35 |
| 1988 | 13 | 21 | 88  | 154 | 196 | 242 | 281 | 304 | 327 | 34 |
| 1989 | 7  | 33 | 79  | 162 | 207 | 238 | 274 | 303 | 324 | 35 |
| 1990 | 10 | 31 | 92  | 161 | 200 | 234 | 255 | 287 | 319 | 33 |
| 1991 | 10 | 48 | 100 | 147 | 186 | 217 | 251 | 270 | 303 | 32 |
| 1992 | 9  | 25 | 100 | 148 | 181 | 216 | 252 | 275 | 295 | 31 |
| 1993 | 18 | 29 | 108 | 153 | 188 | 215 | 251 | 279 | 302 | 32 |
| 1994 | 12 | 37 | 79  | 131 | 175 | 203 | 223 | 253 | 289 | 30 |
| 1995 | 15 | 42 | 76  | 136 | 187 | 223 | 247 | 293 | 300 | 32 |
| 1996 | 10 | 33 | 98  | 137 | 168 | 228 | 266 | 308 | 332 | 35 |
| 1997 | 19 | 34 | 80  | 161 | 190 | 238 | 284 | 314 | 358 | 37 |
| 1998 | 10 | 38 | 76  | 131 | 177 | 210 | 251 | 296 | 308 | 33 |
| 1999 | 20 | 42 | 75  | 120 | 172 | 220 | 263 | 304 | 344 | 37 |
| 2000 | 26 | 61 | 95  | 138 | 171 | 206 | 235 | 269 | 316 | 36 |
| 2001 | 22 | 58 | 108 | 150 | 190 | 227 | 268 | 293 | 327 | 37 |
| 2002 | 18 | 45 | 106 | 148 | 185 | 221 | 255 | 285 | 334 | 39 |
| 2003 | 21 | 42 | 85  | 149 | 182 | 225 | 259 | 294 | 316 |    |
| 2004 | 11 | 35 | 87  | 139 | 190 | 230 | 261 | 300 | 344 | 33 |
| 2005 | 19 | 35 | 83  | 141 | 191 | 233 | 265 | 306 | 322 | 36 |

Table 21. Acoustic age composition for the overall SW Nova Scotia/Bay of Fundy component from 1999 to 2005.

| Year and Area          | Type Data        | Age 2   | Age 3     | Age 4     | Age 5     | Age 6   | Age 7   | Age 8  | Age 9 | Age 10 | Age 11+ | Total     |
|------------------------|------------------|---------|-----------|-----------|-----------|---------|---------|--------|-------|--------|---------|-----------|
| 1999 Acoustics Overall | % catch wt.      | 0%      | 0%        | 13%       | 44%       | 32%     | 9%      | 0%     | 0%    | 0%     | 0%      | 100%      |
| 2000 Acoustics Overall | % catch wt.      | 2%      | 4%        | 21%       | 35%       | 23%     | 12%     | 2%     | 0%    | 0%     | 0%      | 100%      |
| 2001 Acoustics Overall | % catch wt.      | 1%      | 40%       | 15%       | 20%       | 14%     | 8%      | 2%     | 0%    | 0%     | 0%      | 100%      |
| 2002 Acoustics Overall | % catch wt.      | 1%      | 10%       | 53%       | 20%       | 9%      | 6%      | 1%     | 0%    | 0%     | 0%      | 100%      |
| 2003 Acoustics Overall | % catch wt.      | 1%      | 33%       | 28%       | 29%       | 5%      | 3%      | 0%     | 0%    | 0%     | 0%      | 100%      |
| 2004 Acoustics Overall | % catch wt.      | 0%      | 26%       | 35%       | 30%       | 6%      | 3%      | 0%     | 0%    | 0%     | 0%      | 100%      |
| 2005 Acoustics Overall | % catch wt.      | 0%      | 10%       | 61%       | 22%       | 5%      | 2%      | 0%     | 0%    | 0%     | 0%      | 100%      |
| 1999 Acoustics Overall | % numbers        | 0%      | 0%        | 18%       | 48%       | 27%     | 7%      | 0%     | 0%    | 0%     | 0%      | 100%      |
| 2000 Acoustics Overall | % numbers        | 6%      | 6%        | 25%       | 34%       | 18%     | 8%      | 1%     | 0%    | 0%     | 0%      | 100%      |
| 2001 Acoustics Overall | % numbers        | 3%      | 51%       | 15%       | 16%       | 9%      | 5%      | 1%     | 0%    | 0%     | 0%      | 100%      |
| 2002 Acoustics Overall | % numbers        | 2%      | 13%       | 57%       | 17%       | 6%      | 4%      | 1%     | 0%    | 0%     | 0%      | 100%      |
| 2003 Acoustics Overall | % numbers        | 4%      | 43%       | 26%       | 22%       | 3%      | 2%      | 0%     | 0%    | 0%     | 0%      | 100%      |
| 2004 Acoustics Overall | % numbers        | 1%      | 34%       | 37%       | 23%       | 4%      | 1%      | 0%     | 0%    | 0%     | 0%      | 100%      |
| 2005 Acoustics Overall | % numbers        | 0%      | 14%       | 64%       | 17%       | 3%      | 1%      | 0%     | 0%    | 0%     | 0%      | 100%      |
| 1999 Acoustics Overall | Avg. len (cm)    | 23.5    | 24.1      | 25.8      | 27.8      | 30.1    | 31.9    | 33.1   | 34.5  | 35.5   |         | 28.4      |
| 2000 Acoustics Overall | Avg. len (cm)    | 20.8    | 24.8      | 26.7      | 28.5      | 30.4    | 31.9    | 33.2   | 34.2  | 36.0   |         | 28.0      |
| 2001 Acoustics Overall | Avg. len (cm)    | 21.1    | 25.1      | 26.9      | 28.7      | 30.4    | 31.9    | 32.7   | 34.1  | -      |         | 26.7      |
| 2002 Acoustics Overall | Avg. len (cm)    | 19.8    | 25.2      | 27.1      | 28.8      | 30.6    | 31.8    | 32.7   | 34.0  | 35.5   |         | 27.4      |
| 2003 Acoustics Overall | Avg. len (cm)    | 19.4    | 24.6      | 27.3      | 28.7      | 30.6    | 31.8    | 33.2   | 35.5  | -      |         | 26.3      |
| 2004 Acoustics Overall | Avg. len (cm)    | 20.5    | 24.7      | 26.6      | 29.0      | 30.8    | 31.7    | 33.3   | 35.0  | -      |         | 26.7      |
| 2005 Acoustics Overall | Avg. len (cm)    | 18.8    | 24.5      | 26.8      | 29.2      | 30.9    | 31.9    | 33.8   |       | 35.0   |         | 27.0      |
| 1999 Acoustics Overall | Avg. wt. (g)     | 104.5   | 113.2     | 140.7     | 176.4     | 226.9   | 272.4   | 304.6  | 349.2 | 383.2  |         | 190.8     |
| 2000 Acoustics Overall | Avg. wt. (g)     | 62.1    | 111.0     | 141.7     | 176.3     | 215.7   | 252.1   | 289.3  | 325.1 | 387.9  |         | 171.6     |
| 2001 Acoustics Overall | Avg. wt. (g)     | 66.7    | 121.0     | 153.5     | 191.1     | 229.3   | 269.8   | 293.8  | 331.2 | -      |         | 154.5     |
| 2002 Acoustics Overall | Avg. wt. (g)     | 52.6    | 117.3     | 150.0     | 183.7     | 225.8   | 261.2   | 289.1  | 308.6 | 399.6  |         | 158.6     |
| 2003 Acoustics Overall | Avg. wt. (g)     | 52.0    | 109.8     | 155.3     | 184.4     | 226.8   | 257.9   | 295.4  | 375.0 | -      |         | 142.2     |
| 2004 Acoustics Overall | Avg. wt. (g)     | 60.1    | 111.7     | 143.2     | 190.6     | 231.9   | 257.3   | 302.8  | 355.1 | -      |         | 148.1     |
| 2005 Acoustics Overall | Avg. wt. (g)     | 46.0    | 109.1     | 146.8     | 195.2     | 233.5   | 260.4   | 315.5  |       | 365.5  |         | 153.8     |
| 1999 Acoustics Overall | Catch wt. (t)    | 2       | 1,340     | 65,702    | 222,154   | 164,425 | 47,128  | 1,759  | 2,321 | 360    | 488     | 505,680   |
| 2000 Acoustics Overall | Catch wt. (t)    | 9,970   | 18,896    | 97,401    | 164,048   | 107,143 | 53,938  | 10,782 | 656   | 68     | 401     | 463,309   |
| 2001 Acoustics Overall | Catch wt. (t)    | 5,816   | 181,463   | 70,313    | 89,288    | 64,184  | 38,563  | 7,473  | 721   | -      | ~       | 457,820   |
| 2002 Acoustics Overall | Catch wt. (t)    | 4,268   | 53,164    | 290,700   | 108,883   | 49,212  | 31,696  | 5,019  | 247   | 154    | -       | 543,401   |
| 2003 Acoustics Overall | Catch wt. (t)    | 7,078   | 167,908   | 143,848   | 146,842   | 23,783  | 15,357  | 615    | 0     | -      | -       | 505,432   |
| 2004 Acoustics Overall | Catch wt. (t)    | 1,542   | 123,285   | 170,922   | 144,816   | 27,229  | 12,172  | 991    | 807   | -      | *       | 481,764   |
| 2005 Acoustics Overall | Catch wt. (t)    | 170     | 23,261    | 141,935   | 51,677    | 11,840  | 4,084   | 199    | -     | 2      |         | 233,168   |
| 1999 Acoustics Overall | Numbers (x1,000) | 22      | 11,837    | 466,939   | 1,259,696 | 724,815 | 173,021 | 5,775  | 6,645 | 941    | 1,091   | 2,650,782 |
| 2000 Acoustics Overall | Numbers (x1,000) | 160,418 | 170,220   | 687,340   | 930,573   | 496,803 | 213,924 | 37,273 | 2,019 | 175    | 1,000   | 2,699,924 |
| 2001 Acoustics Overall | Numbers (x1,000) | 87,170  | 1,499,796 | 457,975   | 467,332   | 279,943 | 142,956 | 25,436 | 2,178 | -      | -       | 2,962,785 |
| 2002 Acoustics Overall | Numbers (x1,000) | 81,122  | 453,103   | 1,938,353 | 592,580   | 217,955 | 121,346 | 17,362 | 799   | 385    |         | 3,425,381 |
| 2003 Acoustics Overall | Numbers (x1,000) | 136,238 | 1,528,559 | 926,469   | 796,381   | 104,841 | 59,548  | 2,081  | 1     | -      |         | 3,554,118 |
| 2004 Acoustics Overall | Numbers (x1,000) | 25,675  | 1,103,423 | 1,193,644 | 759,611   | 117,403 | 47,312  | 3,275  | 2,271 | -      |         | 3,252,614 |
| 2005 Acoustics Overall | Numbers (x1,000) | 3,705   | 213,306   | 966,885   | 264,704   | 50,696  | 15,687  | 629    |       | 4      |         | 1,515,617 |

Table 22. Acoustic age composition for the German Bank only component from 1999 to 2005.

| Year and Area             | Type Data        | Age 2   | Age 3     | Age 4     | Age 5     | Age 6   | Age 7   | Age 8  | Age 9 | Age 10 | Age 11+ | Total     |
|---------------------------|------------------|---------|-----------|-----------|-----------|---------|---------|--------|-------|--------|---------|-----------|
| 1999 German Bank Acoustic | % catch wt.      | 0%      | 0%        | 13%       | 43%       | 33%     | 10%     | 0%     | 0%    | 0%     | 0%      | 100%      |
| 2000 German Bank Acoustic | % catch wt.      | 3%      | 5%        | 21%       | 37%       | 22%     | 11%     | 2%     | 0%    | 0%     | 0%      | 100%      |
| 2001 German Bank Acoustic | % catch wt.      | 3%      | 42%       | 15%       | 17%       | 13%     | 9%      | 2%     | 0%    | 0%     | 0%      | 100%      |
| 2002 German Bank Acoustic | % catch wt.      | 1%      | 10%       | 52%       | 20%       | 10%     | 6%      | 1%     | 0%    | 0%     | 0%      | 100%      |
| 2003 German Bank Acoustic | % catch wt.      | 2%      | 38%       | 26%       | 27%       | 5%      | 3%      | 0%     | 0%    | 0%     | 0%      | 100%      |
| 2004 German Bank Acoustic | % catch wt.      | 0%      | 24%       | 37%       | 29%       | 6%      | 3%      | 0%     | 0%    | 0%     | 0%      | 100%      |
| 2005 German Bank Acoustic | % catch wt.      | 0%      | 9%        | 61%       | 23%       | 5%      | 2%      | 0%     | 0%    | 0%     | 0%      | 100%      |
| 1999 German Bank Acoustic | % numbers        | 0%      | 0%        | 18%       | 47%       | 28%     | 7%      | 0%     | 0%    | 0%     | 0%      | 100%      |
| 2000 German Bank Acoustic | % numbers        | 8%      | 7%        | 25%       | 35%       | 17%     | 7%      | 1%     | 0%    | 0%     | 0%      | 100%      |
| 2001 German Bank Acoustic | % numbers        | 6%      | 52%       | 14%       | 13%       | 9%      | 5%      | 1%     | 0%    | 0%     | 0%      | 100%      |
| 2002 German Bank Acoustic | % numbers        | 3%      | 13%       | 55%       | 18%       | 7%      | 4%      | 1%     | 0%    | 0%     | 0%      | 100%      |
| 2003 German Bank Acoustic | % numbers        | 5%      | 47%       | 24%       | 20%       | 3%      | 1%      | 0%     | 0%    | 0%     | 0%      | 100%      |
| 2004 German Bank Acoustic | % numbers        | 1%      | 32%       | 39%       | 23%       | 4%      | 1%      | 0%     | 0%    | 0%     | 0%      | 100%      |
| 2005 German Bank Acoustic | % numbers        | 0%      | 13%       | 64%       | 18%       | 3%      | 1%      | 0%     | 0%    | 0%     | 0%      | 100%      |
| 1999 German Bank Acoustic | Avg. len (cm)    |         | 24.3      | 25.9      | 27.8      | 30.1    | 31.9    | 33.1   | 34.5  | 35.5   |         | 28.4      |
| 2000 German Bank Acoustic | Avg. len (cm)    | 20.8    | 24.7      | 26.7      | 28.6      | 30.5    | 32.1    | 33.4   | 34.3  | 36.0   |         | 27.9      |
| 2001 German Bank Acoustic | Avg. len (cm)    | 20.9    | 24.9      | 26.9      | 28.8      | 30.4    | 31.9    | 32.7   | 34.2  | -      |         | 26.3      |
| 2002 German Bank Acoustic | Avg. len (cm)    | 19.8    | 25.1      | 27.1      | 28.8      | 30.6    | 31.8    | 32.7   | 34.0  | 35.5   |         | 27.3      |
| 2003 German Bank Acoustic | Avg. len (cm)    | 19.4    | 24.6      | 27.2      | 28.8      | 30.6    | 31.8    | 33.2   | -     | -      |         | 26.1      |
| 2004 German Bank Acoustic | Avg. len (cm)    | 20.5    | 24.7      | 26.6      | 28.9      | 30.8    | 31.7    | 33.4   | 35.0  | -      |         | 26.7      |
| 2005 German Bank Acoustic | Avg. len (cm)    | 18.8    | 24.4      | 26.8      | 29.2      | 30.9    | 31.9    | 33.8   |       |        |         | 27.1      |
| 1999 German Bank Acoustic | Avg. wt. (g)     |         | 115.5     | 140.8     | 175.9     | 227.0   | 273.0   | 304.3  | 349.2 | 383.2  |         | 191.0     |
| 2000 German Bank Acoustic | Avg. wt. (g)     | 62.1    | 109.8     | 141.1     | 176.2     | 215.1   | 253.5   | 292.2  | 325.8 | 387.9  |         | 168.3     |
| 2001 German Bank Acoustic | Avg. wt. (g)     | 65.0    | 116.2     | 150.4     | 188.2     | 226.3   | 263.9   | 290.5  | 330.2 | -      |         | 145.2     |
| 2002 German Bank Acoustic | Avg. wt. (g)     | 52.4    | 114.8     | 149.4     | 182.4     | 224.6   | 260.9   | 288.3  | 308.7 | 399.7  |         | 157.3     |
| 2003 German Bank Acoustic | Avg. wt. (g)     | 51.6    | 110.5     | 153.2     | 184.3     | 225.3   | 257.7   | 294.4  | -     | -      |         | 138.1     |
| 2004 German Bank Acoustic | Avg. wt. (g)     | 59.7    | 111.2     | 142.4     | 188.7     | 231.3   | 254.4   | 304.1  | 355.1 | -      |         | 147.9     |
| 2005 German Bank Acoustic | Avg. wt. (q)     | 46.0    | 108.4     | 147.2     | 194.8     | 233.4   | 259.5   | 315.4  |       | -      |         | 154.5     |
| 1999 German Bank Acoustic | Catch wt. (t)    |         | 1,147     | 60,304    | 199,056   | 150,905 | 44,574  | 1,692  | 2,304 | 358    | 483     | 460,823   |
| 2000 German Bank Acoustic | Catch wt. (t)    | 9,925   | 16,104    | 73,991    | 130,516   | 77,649  | 39,509  | 7,673  | 531   | 68     | 400     | 356,372   |
| 2001 German Bank Acoustic | Catch wt. (t)    | 5,539   | 79,728    | 27,881    | 31,435    | 25,436  | 16,294  | 3,602  | 579   | -      | -       | 190,494   |
| 2002 German Bank Acoustic | Catch wt. (t)    | 4,126   | 38,440    | 204,661   | 80,340    | 37,487  | 23,712  | 3,909  | 234   | 152    | -       | 393,121   |
| 2003 German Bank Acoustic | Catch wt. (t)    | 6,149   | 129,474   | 90,497    | 91,212    | 16,202  | 9,448   | 505    |       | -      | -       | 343,486   |
| 2004 German Bank Acoustic | Catch wt. (t)    | 1,344   | 87,359    | 137,786   | 107,750   | 22,383  | 9,414   | 786    | 807   | -      | -       | 367,629   |
| 2005 German Bank Acoustic | Catch wt. (t)    | 160     | 19,812    | 128,673   | 47,501    | 10,851  | 3,773   | 188    |       | -      | -       | 210,959   |
| 1999 German Bank Acoustic | Numbers (x1,000) | -       | 9,924     | 428,280   | 1,131,660 | 664,725 | 163,298 | 5,561  | 6,599 | 934    | 1,079   | 2,412,061 |
| 2000 German Bank Acoustic | Numbers (x1,000) | 159,866 | 146,724   | 524,346   | 740,919   | 360,915 | 155,853 | 26,263 | 1,631 | 175    | 996     | 2.117,866 |
| 2001 German Bank Acoustic | Numbers (x1,000) | 85,238  | 685,939   | 185,393   | 167,059   | 112,396 | 61,752  | 12,400 | 1,753 | -      |         | 1,311,930 |
| 2002 German Bank Acoustic | Numbers (x1,000) | 78,824  | 334,785   | 1,370,159 | 440,402   | 166,919 | 90,875  | 13,560 | 758   | 380    |         | 2,499,028 |
| 2003 German Bank Acoustic | Numbers (x1,000) | 119,130 | 1,172,040 | 590,615   | 494,790   | 71,925  | 36,656  | 1,717  |       |        |         | 2,486,873 |
| 2004 German Bank Acoustic | Numbers (x1,000) | 22,502  | 785,706   | 967,910   | 571,000   | 96,778  | 37,007  | 2,586  | 2,271 |        |         | 2,485,760 |
| 2005 German Bank Acoustic | Numbers (x1,000) | 3,489   | 182,737   | 874,175   | 243,815   | 46,493  | 14,539  | 597    |       |        | -       | 1,365,846 |

Table 23. Exploitation pattern at age for 1990 to 2005 and various periods from the initial VPA calculated based on mean population weighted F for ages 6 to 8. The 2005 values represents the assumptions used in the terminal year of the VPA.

| PR using F(6-8wt'd)    | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  |
|------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1990                   | 0.0 | 0.3 | 0.4 | 8.0 | 0.8 | 0.8 | 1.1 | 1.0 | 0.7 | 1.0 | 0.6 |
| 1991                   | 0.0 | 0.3 | 0.5 | 1.0 | 0.9 | 0.8 | 0.9 | 1.2 | 1.0 | 1.0 | 1.5 |
| 1992                   | 0.0 | 0.8 | 0.4 | 1.0 | 1.0 | 1.1 | 0.9 | 0.9 | 1.3 | 1.1 | 1.1 |
| 1993                   | 0.0 | 0.2 | 0.3 | 0.8 | 0.9 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0.4 |
| 1994                   | 0.0 | 0.1 | 0.3 | 0.4 | 0.9 | 1.0 | 1.2 | 0.9 | 8.0 | 1.0 | 0.4 |
| 1995                   | 0.0 | 0.2 | 0.2 | 0.5 | 0.6 | 0.9 | 1.2 | 0.8 | 0.8 | 1.0 | 0.1 |
| 1996                   | 0.0 | 0.1 | 0.1 | 0.7 | 0.8 | 1.0 | 1.0 | 0.8 | 0.9 | 1.0 | 0.1 |
| 1997                   | 0.0 | 0.1 | 0.3 | 0.4 | 1.1 | 0.9 | 1.2 | 1.6 | 0.7 | 1.0 | 0.1 |
| 1998                   | 0.0 | 0.2 | 0.1 | 0.2 | 0.3 | 0.9 | 1.5 | 1.3 | 1.3 | 1.0 | 0.0 |
| 1999                   | 0.0 | 0.3 | 0.6 | 0.5 | 0.9 | 1.0 | 1.0 | 1.1 | 1.7 | 1.0 | 0.0 |
| 2000                   | 0.0 | 0.2 | 0.2 | 0.4 | 0.7 | 8.0 | 1.4 | 1.5 | 1.8 | 1.0 | 0.0 |
| 2001                   | 0.0 | 0.1 | 0.4 | 0.3 | 0.6 | 0.8 | 1.5 | 1.7 | 1.6 | 1.0 | 0.0 |
| 2002                   | 0.0 | 0.2 | 0.2 | 0.5 | 0.8 | 0.7 | 1.6 | 2.0 | 0.3 | 1.0 | 0.0 |
| 2003                   | 0.0 | 0.2 | 0.5 | 0.4 | 1.1 | 0.8 | 1.5 | 1.2 | 1.2 | 0.0 | 0.0 |
| 2004                   | 0.0 | 0.2 | 0.3 | 0.6 | 1.1 | 0.8 | 1.6 | 2.0 | 1.1 | 0.3 | 0.0 |
| 2005                   | 0.0 | 0.2 | 0.4 | 0.7 | 0.9 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0.0 |
| Avg 1965-1974          | 0.3 | 1.4 | 0.6 | 0.9 | 1.1 | 1.0 | 1.1 | 1.0 | 1.4 | 1.0 | 1.5 |
| Avg 1975-1984          | 0.0 | 0.3 | 0.4 | 0.7 | 0.9 | 0.9 | 0.9 | 1.1 | 1.3 | 1.0 | 1.5 |
| Avg 1985-1994          | 0.0 | 0.4 | 0.5 | 0.9 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0.6 |
| Avg 1995-2004          | 0.0 | 0.2 | 0.3 | 0.5 | 0.8 | 0.9 | 1.4 | 1.4 | 1.1 | 0.8 | 0.0 |
| Avg last 5yr (2000-04) | 0.0 | 0.2 | 0.3 | 0.4 | 0.9 | 0.8 | 1.5 | 1.7 | 1.2 | 0.7 | 0.0 |
| Avg all years (65-04)  | 0.1 | 0.6 | 0.5 | 0.7 | 1.0 | 0.9 | 1.1 | 1.1 | 1.2 | 1.0 | 0.9 |

Table 24. Beginning of year population abundance (numbers 000's) from ADAPT run using the overall acoustic index (ages 4-8) as proportional to population numbers.

| Pop #s Bias     |           |           |           |           |           |         |         |         |         |        |        | Total<br>PopNos | SSB<br>PopNos | Total     |         |
|-----------------|-----------|-----------|-----------|-----------|-----------|---------|---------|---------|---------|--------|--------|-----------------|---------------|-----------|---------|
| Adj(analytical) | 1         | 2         | 3         | 4         | 5         | 6       | 7       | 8       | 9       | 10     | 11     | '000s           | '000s         | Biomass t | SSB t   |
| 1965            | 3,503,534 | 3,848,688 | 995,990   | 1,312,007 | 348,049   | 92,556  | 44,658  | 4,104   | 1,354   | 406    | 500    | 10,151,846      | 2,170,428     | 448,078   | 300,889 |
| 1966            | 2,737,874 | 2,624,572 | 2.177,169 | 784,001   | 863,223   | 239,988 | 66,231  | 35,035  | 2,855   | 1,060  | 707    | 9,532,714       | 3,003,285     | 576,761   | 425,447 |
| 1967            | 6,078,739 | 2,102,325 | 1.329.624 | 1,378,701 | 575,717   | 418,512 | 155,171 | 41,661  | 21,740  | 836    | 1,253  | 12,104,280      | 3,120,533     | 630,063   | 489,845 |
| 1968            | 1,286,168 | 4,325,977 | 1,170,158 | 950,142   | 889,042   | 372,334 | 200,109 | 75,150  | 30,056  | 17,430 | 1,311  | 9,317,877       | 3,025,639     | 626,797   | 489,645 |
| 1969            | 1,754,254 | 904,620   | 1,415,817 | 755,635   | 702.962   | 467,578 | 239,085 | 82.892  | 32,938  | 10,845 | 9,244  | 6,375,870       | 2,933,524     | 540,430   | 461,373 |
| 1970            | 2,304,087 | 1,338,027 | 480,252   | 682,955   | 499,558   | 429,512 | 281,595 | 139,599 | 47,575  | 21,258 | 13,377 | 6,237,795       | 2,287,259     | 493,215   | 435,280 |
| 1971            | 7,460,417 | 1,258,574 | 579,796   | 324,285   | 303,152   | 228,973 | 243,661 | 130,382 | 77,266  | 19,947 | 19,640 | 10,646,092      | 1,604,775     | 418,839   | 326,339 |
| 1972            | 1,138,007 | 6.028.985 | 667,899   | 309,749   | 169,889   | 146,502 | 119,687 | 115,682 | 61,966  | 30,575 | 20,551 | 8,809,493       | 1,277,576     | 427,933   | 257,782 |
| 1973            | 2,336,523 | 931,722   | 4,350,854 | 481,941   | 121,063   | 70,132  | 52,761  | 54,102  | 51,165  | 27,434 | 19,153 | 8,496,850       | 3,004,984     | 498,727   | 316,858 |
| 1974            | 1,625,829 | 1,912,063 | 612,115   | 2,859,195 | 277,069   | 63,139  | 30,305  | 23,481  | 26,162  | 20,577 | 15,921 | 7,465,858       | 3,335,988     | 576,167   | 466,828 |
| 1975            | 247.148   | 1,314,489 | 880,008   | 416,859   | 1,619,372 | 165,491 | 34,561  | 15,639  | 13,330  | 10.013 | 15,485 | 4,732,396       | 2,689,070     | 516,875   | 461,061 |
| 1976            | 721.820   | 199,458   | 790,742   | 505,119   | 229,479   | 864,256 | 76,167  | 17,278  | 8.846   | 6,633  | 11,863 | 3,431,662       | 2,064,500     | 389.059   | 357,084 |
| 1977            | 4,140,081 | 590,760   | 113,384   | 461,878   | 275,572   | 126,138 | 466,414 | 43,093  | 9,149   | 3,712  | 10,203 | 6,240,385       | 1,406,665     | 341,890   | 292,120 |
|                 | 1,346,539 |           | 345,406   | 64,483    | 183,136   | 119,041 | 57,492  | 223,170 | 22,748  | 4,650  | 6,640  | 5,761,860       | 847,615       | 264,317   | 185,307 |
| 1979            |           | 1,070,508 | 2,428,553 | 245,946   | 41,184    | 41,880  | 36,645  | 19,392  | 85.497  | 8,737  | 5,577  | 4,433.065       | 1,674,539     | 262,852   | 167,544 |
|                 | 1,572,597 | 367,422   |           | 1,762,596 | 152,252   |         | 13.695  |         |         | 33.069 | 5,530  | 4.665,920       | 2,194,223     | 368,282   | 304,527 |
|                 | 1,669,558 |           | 289.532   | 509,412   |           |         |         | 7,007   | 5,380   |        | 19.616 |                 | 1,773,471     | 362,179   | 311,026 |
|                 | 2,302,838 |           | 959,467   | 191,249   |           | 429,491 |         |         | 3,261   |        | 15.067 |                 | 1,492,838     |           | 246,240 |
|                 |           | 1,882,162 |           | 649.785   |           |         | 163,382 |         | 9,523   |        | 12,505 | 8.167,572       | 1,628,400     | 348,357   | 245,507 |
|                 |           | 3.334,258 |           | 705,445   | 313,499   |         |         |         | 14,768  |        |        |                 | 1,897,384     | 424,424   | 276,947 |
|                 |           | 4,115,990 |           | 900,962   |           | 126,231 |         |         | 18,746  |        | 3.339  |                 | 2,772,125     |           | 376,214 |
|                 |           |           | 3,174,295 |           |           | 175,953 |         |         |         |        |        |                 | 4,045,410     | 762,585   | 566,868 |
|                 | 1,397,308 |           | 1,107,935 |           |           |         |         |         |         | 20.942 |        | 7.527.073       | 4,473,242     | 819,446   | 714,331 |
|                 |           | 1,141,942 | 635,504   |           | 1,449,860 |         |         |         |         | 14,308 |        |                 | 3,668,409     |           | 641,945 |
|                 |           | 1,147,656 | 801,233   | 418,412   |           |         |         | 149.310 |         | 20,211 |        | 6.076.194       | 2,741,466     | 558.575   | 507,688 |
|                 | 1,185,719 |           | 847,830   | 553,220   |           |         |         | 304.643 |         |        |        |                 | 2,494,198     |           | 461,548 |
| 1991            | 579,910   |           | 1,008,567 | 576,914   |           |         |         | 229,416 |         |        |        | 4,222,188       | 2.109.518     | 404,647   | 344,924 |
| 1992            | 824,078   | 474,790   | 707,394   | 664,216   |           | 165,457 |         |         | 115,487 |        |        |                 | 1,844,874     |           | 296,235 |
|                 | 1,669,807 | 674,690   | 237,693   | 459.804   |           | 138,696 |         | 42.113  | 44,305  | 41,843 | 51,315 | 3,715,661       | 1,206 337     | 244,961   | 201,234 |
| 1994            |           | 1.366,972 | 483,523   | 155,220   |           | 118,503 |         |         |         | 16,747 |        | 3,362,639       | 861,333       | 180.827   | 126,506 |
|                 | 1,031,470 | 717,932   |           | 268,195   | 78,955    |         |         |         | 7,693   |        | 29,629 | 3,269,618       |               |           | 99.626  |
| 1996            | 913,346   | 842,843   | 485,628   | 641,941   | 119,202   | 31,801  |         | 7,177   | 3,759   |        | 22,358 | 3.088.345       |               |           | 114,716 |
|                 | 1,190,194 | 747.785   | 656,218   | 363,580   | 296,445   |         |         | 6.373   |         |        | 17,773 | 3,342,691       |               |           |         |
| 1998            | 619,421   | 974,127   | 561,215   | 458,527   |           | 125,595 |         | 4,439   |         |        | 14,426 | 3.011.864       |               |           |         |
|                 | 1,700,724 | 507,015   |           | 403,309   | 250,907   | 99,434  |         | 1,005   | 282     |        | 11,630 | 3,551,305       |               |           |         |
| 2000            | 695,211   |           | 313,603   | 258,409   | 197,780   |         |         | 5,174   | 279     |        |        | 2.988.831       |               |           | 90,187  |
|                 | 1,320,249 | 568,431   | 810,998   | 189,053   | 114,490   |         |         |         |         |        | 7,803  | 3.084.316       |               |           |         |
|                 |           | 1,080,882 | 399,285   | 372,946   | 103,480   |         |         |         |         |        |        | 3,846,230       |               |           | 89,721  |
|                 | 1,109,406 |           | 612,261   | 238,308   | 118,014   |         |         |         |         |        | 5.230  |                 |               |           |         |
| 2004            |           |           |           | 196,503   | 92,625    |         |         |         |         |        | 4,291  | 2,414,134       |               |           | 63,123  |
|                 | 1.000.000 |           | 456,017   | 325,797   |           | 6,314   |         | 72      |         |        |        |                 |               |           |         |
| 2000            | 1,000,000 | 818.609   | 214,219   | 220,091   | 105,786   | 10.874  |         |         |         |        | 2.877  |                 |               |           | 48,646  |

Table 25. Fishing mortality rate from ADAPT run using the overall acoustic index (ages 4-8) as proportional to population numbers.

| numbers.               |      |      |      |      |      |      |      |      |      |      |          |      |           |      |
|------------------------|------|------|------|------|------|------|------|------|------|------|----------|------|-----------|------|
| F Bias Adj(analytical) | 1    | _    | 3    |      | 5    | 6    | 7    | -    |      |      |          |      | F5-8(wtd) |      |
|                        |      |      |      |      |      |      |      |      |      | 0.11 |          | 0.15 |           |      |
|                        |      |      |      |      |      |      |      |      |      | 0.25 |          |      |           |      |
|                        |      |      |      |      |      |      |      |      |      | 0.49 |          |      |           |      |
|                        |      |      |      |      |      |      |      |      |      | 0.44 |          |      |           |      |
|                        |      |      |      |      |      |      |      |      |      | 0.32 |          |      |           |      |
|                        |      |      |      |      |      |      |      |      |      | 0.45 |          |      |           |      |
| 1971                   | 0.01 | 0.43 | 0.43 | 0.45 | 0.53 | 0.45 | 0.54 | 0.54 | 0.73 | 0.53 | 0.38     | 0.51 | 0.51      | 2.0  |
| 1972                   | 0.00 | 0.13 | 0.13 | 0.74 | 0.68 | 0.82 | 0.59 | 0.62 | 0.61 | 0.68 | 0.96     | 0.71 | 0.69      | 0.69 |
| 1973                   | 0.00 | 0.22 | 0.22 | 0.35 | 0.45 | 0.64 | 0.61 | 0.53 | 0.71 | 0.62 | 1.40     | 0.54 | 0.54      | 0.60 |
| 1974                   | 0.01 | 0.58 | 0.18 | 0.37 | 0.32 | 0.40 | 0.46 | 0.37 | 0.76 | 0.47 | 0.96     | 0.34 | 0.34      | 0.41 |
| 1975                   | 0.01 | 0.31 | 0.36 | 0.40 | 0.43 | 0.58 | 0.49 | 0.37 | 0.50 | 0.54 | 0.58     | 0.44 | 0.44      | 0.55 |
| 1976                   | 0.00 | 0.36 | 0.34 | 0.41 | 0.40 | 0.42 | 0.37 | 0.44 | 0.67 | 0.42 | 0.38     | 0.41 | 0.41      | 0.41 |
| 1977                   | 0.00 | 0.34 | 0.36 | 0.73 | 0.64 | 0.59 | 0.54 | 0.44 | 0.48 | 0.54 | 0.54     | 0.58 | 0.57      | 0.54 |
| 1978                   | 0.03 | 0.13 | 0.14 | 0.25 | 1.28 | 0.98 | 0.89 | 0.76 | 0.76 | 0.84 | 0.32     | 1.11 | 0.98      | 0.84 |
| 1979                   | 0.00 | 0.21 | 0.12 | 0.28 | 0.16 | 0.92 | 0.78 | 1.08 | 0.75 | 0.83 | 0.64     |      | 0.68      | 0.90 |
| 1980                   | 0.00 | 0.04 | 0.13 | 0.35 | 0.23 | 0.18 | 0.47 | 0.74 | 0.93 | 0.43 | 0.78     | 0.24 | 0.27      | 0.39 |
| 1981                   | 0.00 | 0.09 | 0.21 | 0.25 | 0.66 | 0.45 | 0.15 | 0.57 | 0.49 | 0.41 | 0.13     | 0.63 | 0.63      | 0.41 |
| 1982                   | 0.00 | 0.09 | 0.19 | 0.14 | 0.40 | 0.77 | 0.37 | 0.18 | 0.60 | 0.71 | 0.08     | 0.59 | 0.59      | 0.71 |
| 1983                   | 0.00 | 0.12 | 0.18 | 0.53 | 0.22 | 0.47 | 0.91 | 0.49 | 0.22 | 0.65 | 0.12     | 0.55 | 0.55      | 0.67 |
| 1984                   | 0.00 | 0.03 | 0.22 | 0.43 | 0.71 | 0.33 | 0.30 | 0.85 | 1.19 | 0.48 | 3.75     | 0.57 | 0.59      | 0.44 |
| 1985                   | 0.01 | 0.06 | 0.15 | 0.46 | 0.56 | 0.46 | 0.35 | 0.45 | 0.63 | 0.45 | 0.17     | 0.52 | 0.51      | 0.43 |
| 1986                   | 0.00 | 0.10 | 0.10 | 0.19 | 0.14 | 0.22 | 0.20 | 0.17 | 0.12 | 0.20 | 0.10     | 0.17 | 0.17      | 0.21 |
| 1987                   | 0.00 | 0.11 | 0.13 | 0.28 | 0.24 | 0.17 | 0.20 | 0.20 | 0.19 | 0.18 | 0.09     | 0.22 | 0.22      | 0.18 |
| 1988                   | 0.00 | 0.15 | 0.22 | 0.31 | 0.40 | 0.38 | 0.23 | 0.36 | 0.17 | 0.34 | 0.16     | 0.38 | 0.38      | 0.35 |
| 1989                   | 0.00 | 0.10 | 0.17 | 0.18 | 0.20 | 0.27 | 0.20 | 0.14 | 0.23 | 0.23 | 0.16     | 0.23 | 0.23      | 0.23 |
| 1990                   | 0.00 | 0.15 | 0.18 | 0.42 | 0.42 | 0.43 | 0.58 | 0.54 | 0.39 | 0.52 | 0.30     | 0.50 | 0.51      | 0.53 |
| 1991                   | 0.00 | 0.12 | 0.22 | 0.43 | 0.39 | 0.35 | 0.40 | 0.49 | 0.42 | 0.42 | 0.63     | 0.38 | 0.41      | 0.42 |
| 1992                   | 0.00 | 0.49 | 0.23 | 0.64 | 0.60 | 0.69 | 0.55 | 0.54 | 0.82 | 0.66 | 0.69     | 0.62 | 0.61      | 0.61 |
|                        |      |      |      |      |      |      |      |      |      | 0.77 |          |      | 0.73      | 0.77 |
| 1994                   | 0.00 | 0.09 | 0.39 | 0.48 | 1.00 | 1.09 | 1.32 | 1.00 | 0.96 | 1.13 | 0.44     | 1.07 | 1.07      | 1.14 |
| 1995                   | 0.00 | 0.19 | 0.27 | 0.61 | 0.71 | 1.04 | 1.32 | 0.93 | 0.91 | 1.10 | 0.14     | 0.94 | 0.94      | 1.11 |
| 1996                   | 0.00 | 0.05 | 0.09 | 0.57 | 0.69 | 0.86 | 0.82 | 0.70 | 0.73 | 0.82 | 0.08     | 0.74 | 0.74      | 0.83 |
|                        |      |      |      |      |      |      |      | ~    | 200  | 0.61 | and make | 0.00 | 0.65      | 0.62 |
| 1998                   | 0.00 | 0.35 | 0.13 | 0.40 | 0.63 | 1.79 | 2.93 | 2.56 | 2.60 | 1.99 | 0.03     | 1.16 | 1.17      | 1.98 |
| 1999                   | 0.00 | 0.28 | 0.57 | 0.51 | 0.84 | 0.98 | 1.00 | 1.08 | 1.66 | 0.99 | 0.00     | 0.89 | 0.89      | 0.99 |
| 2000                   | 0.00 | 0.34 | 0.31 | 0.61 | 1.14 | 1.36 | 2.33 | 2.47 | 3.01 | 1.65 | 0.00     | 1.31 | 1.33      | 1.64 |
| 2001                   | 0.00 | 0.15 | 0.58 | 0.40 | 0.85 | 1.10 | 2.20 | 3.12 | 2.32 | 1.45 | 0.00     | 1.06 | 1.08      | 1.45 |
| 2002                   | 0.01 | 0.37 | 0.32 | 0.95 | 1.53 | 1.41 | 3.12 | 3.98 | 1.92 | 1.92 | 0.00     | 1.64 | 1.67      | 1.92 |
| 2003                   | 0.00 | 0.45 | 0.94 | 0.74 | 2.09 | 1.47 | 2.91 | 2.31 | 2.88 | 0.00 | 0.00     | 2.06 | 2.06      | 1.91 |
| 2004                   | 0.01 | 0.49 | 0.67 | 1.31 | 2.49 | 1.84 | 3.67 | 4.60 | 2.45 | 2.31 | 0.00     | 2.45 | 2.46      | 2.31 |
| 2005                   | 0.00 | 0.26 | 0.53 | 0.92 | 1.19 | 1.32 | 1.32 | 1.32 | 1.32 | 1.32 | 0        | 1.21 | 1.21      | 1.32 |

Table 26. Deterministic projection inputs for SW Nova Scotia/Bay of Fundy spawning component .

|        | F level | Exp rate u | 1/u    |
|--------|---------|------------|--------|
| F0.1   | 0.228   | 0.185      | 5.3913 |
| test F | 0.210   | 0.172      | 5.8046 |
| Fmax   | 0.568   | 0.396      | 2.5223 |

|        | F level | Exp rate u | 1/u    |
|--------|---------|------------|--------|
| F0.1   | 0.228   | 0.185      | 5.3913 |
| test F | 0.200   | 0.165      | 6.0665 |
| Fmax   | 0.568   | 0.396      | 2.5223 |

F0.1 and Fmax from 2004 run in YPR\_2004.xls -using PR for 1993-2002, wts for 1965-2003, mat=50% 3's, 100% 4+

Inputs below are version with correct wts at age for 2006-2007 5 2 3 6 7 8 9 10 2006 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 PR 2 3 4 5 8 10 11 0.2 0.7 0.9 2006 0.4 Beg wt 2 10 2006 0.019046 0.019356 0.053801 0.110614 0.16285 0.210236 0.246411 0.2826449 0.310813 0.354306 0.354306 2007 0.019046 0.019356 0.053801 0.110614 0.16285 0.210236 0.246411 0.2826449 0.310813 0.354306 0.354306 Avg wt 3 5 6 10 0.0192 0.034733 0.083257 0.140896 0.191433 0.23252 0.264503 0.3061911 0.321934 0.364893 0.364893 2006 Maturity 0 0.5 0.9 2006 0 0.5 0.9 2007 0 0

Table 27. Beginning of year population abundance (numbers 000's) from ADAPT run using the German Bank only index (ages 4-8) as proportional to population numbers.

| Pop #s Bias     |           |           |           |           |           |         |         |         |         |        |        | Total<br>PopNos | SSB<br>PopNos | Total     |         |
|-----------------|-----------|-----------|-----------|-----------|-----------|---------|---------|---------|---------|--------|--------|-----------------|---------------|-----------|---------|
| Adi(analytical) | 1         | 2         | 3         | 4         | 5         | 6       | 7       | 8       | 9       | 10     | 11     | '000s           | '000s         | Biomass t | SSB t   |
| 1965            | 3.503.534 | 3.848.688 | 995,990   | 1,312,007 | 348,049   | 92,556  | 44,658  | 4,104   | 1.354   | 406    | 500    | 10,151,846      | 2,170,428     |           | 300,889 |
| 1966            | 2,737.874 | 2.624,572 | 2,177,169 | 784,001   | 863,223   | 239,988 | 66,231  | 35,035  | 2.855   | 1,060  | 707    |                 | 3,003,285     | 576,761   | 425,447 |
| 1967            | 6,078,739 | 2,102,325 | 1,329,624 | 1,378,701 | 575,717   | 418,512 | 155,171 | 41,661  | 21,740  | 836    | 1.253  | 12,104,280      | 3,120,533     | 630,063   | 489.845 |
| 1968            | 1.286,168 | 4.325,977 | 1,170,158 | 950,142   | 889,042   | 372.334 | 200,109 | 75,150  | 30.056  | 17,430 | 1,311  | 9,317,877       | 3,025,639     | 626,797   | 489,645 |
| 1969            | 1,754,254 | 904,620   | 1,415,817 | 755,635   | 702,962   | 467,578 | 239.085 | 82,892  | 32.938  | 10,845 | 9,244  | 6,375,870       | 2,933,524     | 540,430   | 461,373 |
| 1970            | 2,304,087 | 1,338,027 | 480,252   | 682,955   | 499,558   | 429,512 | 281,595 | 139,599 | 47,575  | 21,258 | 13,377 |                 | 2.287.259     | 493,215   | 435,280 |
| 1971            | 7,460,417 | 1,258,574 | 579,796   | 324,285   | 303,152   | 228,973 | 243,661 | 130,382 | 77,266  | 19,947 | 19,640 | 10,646,092      | 1,604,775     | 418,839   | 326,339 |
| 1972            | 1,138,007 | 6,028,985 | 667,899   | 309.749   | 169,889   | 146,502 | 119,687 | 115,682 | 61,966  | 30,575 | 20,551 | 8,809,493       | 1,277,576     | 427,933   | 257,782 |
| 1973            | 2,336,523 | 931,722   | 4,350,854 | 481,941   | 121,063   | 70,132  | 52,761  | 54,102  | 51,165  | 27,434 | 19,153 | 8,496,850       | 3,004,984     | 498,727   | 316,858 |
| 1974            | 1,625,829 | 1,912,063 | 612,115   | 2,859,195 | 277,069   | 63,139  | 30,305  | 23,481  | 26,162  | 20.577 | 15,921 | 7,465,858       | 3,335,988     | 576,167   | 466,828 |
| 1975            | 247,148   | 1,314,489 | 880,008   | 416,859   | 1,619,372 | 165,491 | 34,561  | 15,639  | 13,330  | 10.013 | 15,485 | 4.732,396       | 2,689,070     | 516,875   | 461,061 |
| 1976            | 721,820   | 199,458   | 790,742   | 505,119   | 229,479   | 864,256 | 76,167  | 17,278  | 8.846   | 6,633  | 11,863 | 3,431,662       | 2,064,500     | 389,059   | 357,084 |
| 1977            | 4,140,081 | 590,760   | 113,384   | 461,878   | 275,572   | 126,138 | 466,414 | 43,093  | 9,149   | 3,712  | 10,203 | 6,240,385       | 1,406,665     | 341,890   | 292,120 |
| 1978            | 1,346,539 | 3,388,555 | 345,406   | 64,483    | 183,136   | 119,041 | 57.492  | 223,170 | 22,748  | 4.650  | 6,640  | 5,761,860       | 847,615       | 264,317   | 185,307 |
| 1979            | 449,147   | 1,070,508 | 2,428,553 | 245,946   | 41,184    | 41,880  | 36,645  | 19,392  | 85,497  | 8,737  | 5,577  | 4,433,065       | 1,674,539     | 262,852   | 167,544 |
| 1980            | 1,572,597 | 367,422   | 710,839   | 1,762,596 | 152,252   | 28,826  | 13,695  | 13,722  | 5,372   | 33,069 | 5,530  | 4,665,920       | 2,194,223     | 368,282   | 304,527 |
| 1981            | 1,669,558 | 1,285,420 | 289,532   | 509,412   | 1,017,308 | 99,518  | 19,663  | 7.007   | 5,380   | 1,742  | 19,616 | 4,924,156       | 1,773,471     | 362,179   | 311,026 |
| 1982            | 2,302,838 | 1,366,918 | 959,467   | 191,249   | 324,646   | 429,491 | 51,910  | 13,919  | 3,261   | 2,687  | 15,067 | 5,661,453       | 1,492,838     | 320,454   | 246,240 |
| 1983            | 4,078,526 | 1,882,162 | 1,027,010 | 649,785   | 136,177   | 177,675 | 163,382 | 29,368  | 9,523   | 1,459  | 12,505 | 8,167,572       | 1,628,400     | 348,357   | 245,507 |
| 1984            | 5,027,282 | 3,334,258 | 1,368,174 | 705,445   | 313,499   | 89,457  | 91,079  | 53,687  | 14,768  | 6,242  | 9,665  | 11,013,555      | 1,897,384     | 424,424   | 276,947 |
| 1985            | 1,831,381 | 4,115,990 | 2,650,014 | 900,962   | 376,337   | 126,231 | 52,832  | 55,107  | 18,746  | 3,661  | 3,339  | 10,134,600      | 2,772,125     | 582,291   | 376,214 |
| 1986            | 1,059,694 | 1,491,259 | 3,174,295 | 1,865,457 | 466,203   | 175,953 | 65,334  | 30,614  | 28,818  | 8,199  | 4,231  | 8,370,056       | 4,045,410     | 762,585   | 566,868 |
| 1987            | 1,397,308 | 867,547   | 1,107,935 | 2,350,078 | 1,263,651 | 330,385 | 115,618 | 43,794  | 21,173  | 20,942 | 8,641  | 7,527,073       | 4,473,242     | 819,446   | 714,331 |
| 1988            | 1,401,917 | 1,141,942 | 635,504   | 793,142   | 1,449,860 | 816,306 | 229,118 | 77,122  | 29,291  | 14,308 | 20,824 | 6,609,334       | 3,668,409     | 702,333   | 641,945 |
| 1989            | 1,744,614 | 1,147,656 | 801,233   | 418,412   | 474,051   | 797,404 | 456,413 | 149,310 | 44,098  | 20,211 | 22,791 | 6,076,194       | 2,741,466     | 558,575   | 507,688 |
| 1990            | 1,185,719 | 1,428,362 | 847,830   | 553,220   | 286,868   | 316,593 | 500,847 | 304,643 | 105,751 | 28,662 | 29,020 | 5,587,516       | 2,494,198     | 517,598   | 461,548 |
| 1991            | 579,910   | 970,785   | 1,008,567 | 576,914   | 299,026   | 154,203 | 168,557 | 229,416 | 144,866 | 58,343 | 31,602 | 4,222,188       | 2,109,518     | 404,647   | 344,924 |
| 1992            | 824,078   | 474,790   | 707,394   | 664,216   | 307,618   | 165,457 | 89,111  | 92,791  | 115,487 | 77,777 | 45,143 | 3,563,861       | 1,844,874     | 340,460   | 296,235 |
| 1993            | 1,669,807 | 674,690   | 237,693   | 459,804   | 287,340   | 138,696 | 68,056  | 42,113  | 44,305  | 41,843 | 51,315 | 3,715,661       | 1,206,337     | 244,961   | 201,234 |
| 1994            | 877,050   | 1,366,972 | 483,523   | 155,220   | 202,812   | 118,503 | 53,150  | 25,557  | 15,331  | 16,747 | 47,773 | 3,362,639       | 861,333       | 180,827   | 126,506 |
| 1995            | 1,031,471 | 717,932   |           | 268,195   | 78,955    | 61,164  | 32,668  | 11,627  | 7,693   | 4,810  | 29,629 | 3,269,618       | 980,658       | 156,145   | 99,626  |
| 1996            | 913,353   | 842.843   | 485,628   | 641,941   | 119,202   | 31,801  | 17,745  | 7,177   | 3,759   | 2,545  | 22,358 | 3,088,351       | 1,025,147     | 160,550   | 114,716 |
|                 |           | 747,790   | 656,218   | 363,580   | 296,445   | 48,890  | 11,017  | 6,373   | 2,929   |        | 17,773 |                 | 1,040,246     | 179,192   | 127,988 |
| 1998            | 619,517   | 974,132   | 561,219   | 458,527   | 227,441   | 125,595 | 23,094  | 4,439   | 1,984   | 1,596  | 14,426 | 3,011,971       | 1,091,859     | 181,262   | 133,106 |
|                 | 1,702,100 | 507,094   | 559,661   | 403,312   | 250,907   | 99,434  | 17,222  | 1,005   | 282     | 121    | 11,630 | 3,552,768       | 1,023,412     | 164,003   | 115,312 |
| 2000            | 699,645   | 1,391,128 | 313,667   | 258,412   | 197,783   | 88,303  | 30,480  | 5,174   | 279     | 44     | 9,547  |                 | 721,015       | 163,751   | 90,190  |
|                 | 1,345,106 | 572,061   | 811,919   | 189,106   | 114,493   | 51,893  | 18,599  | 2,432   | 359     | 11     | 7,803  | 3,113,782       | 771,745       | 168,573   | 89,742  |
|                 | 1,995,355 |           | 402,256   | 373,696   | 103,522   | 39,928  | 14,187  | 1,682   | 88      | 29     | 6,387  |                 | 703,277       | 168,872   | 89,931  |
|                 | 1.342,461 |           | 628,886   | 240,736   | 118,619   | 18,408  | 7,985   | 516     | 26      | 11     | 5,230  |                 | 681,899       | 162,528   | 73,738  |
| 2004            |           | 1,098,699 | 889,632   | 209,925   | 94,595    | 12,372  | 3,500   | 358     | 43      | 1      | 4,291  |                 | 748,909       | 130,543   | 68,270  |
|                 | 1,000,000 | 473,295   | 611,752   | 417,166   | 54,332    | 7,765   | 1,902   | 89      | 4       | 4      | 3,513  | COLUMN TOWN     | 748,934       | 119,486   | 70,208  |
| 2006            | 1,000,000 | 818,609   | 322,624   | 347,187   | 179,860   | 19,503  | 2,543   | 623     | 29      | 1      | 2,877  | 2,693,857       | 679,217       | 125,874   | 78,464  |

Table 28. Fishing mortality rate from ADAPT run using the German Bank only acoustic index (ages 4-8) as proportional to population numbers.

F Bias Adj(analytical) 1 2 3 4 5 6 7 8 9 10 11 F5-7(wtd) F5-8(wtd) F6-8(wtd)

| Jaiation name      | 00.0 |      |      |      |      |      |      |      |      |      |      |      |           |      |
|--------------------|------|------|------|------|------|------|------|------|------|------|------|------|-----------|------|
| as Adj(analytical) |      |      |      |      |      |      |      |      |      |      |      |      | F5-8(wtd) |      |
| 1965               |      |      |      |      |      |      |      |      |      |      |      |      |           |      |
| 1966               | 0.06 | 0.48 | 0.26 | 0.11 | 0.52 | 0.24 | 0.26 | 0.28 | 1.03 | 0.25 | 0.00 |      |           | 0.25 |
| 1967               | 0.14 | 0.39 | 0.14 | 0.24 | 0.24 | 0.54 | 0.53 | 0.13 | 0.02 | 0.49 | 0.14 |      |           |      |
| 1968               | 0.15 | 0.92 | 0.24 | 0.10 | 0.44 | 0.24 | 0.68 | 0.62 | 0.82 | 0.44 | 2.94 |      |           |      |
| 1969               | 0.07 | 0.43 | 0.53 | 0.21 | 0.29 | 0.31 | 0.34 | 0.36 | 0.24 | 0.32 | 0.09 | 0.31 | 0.31      | 0.32 |
| 1970               | 0.40 | 0.64 | 0.19 | 0.61 | 0.58 | 0.37 | 0.57 | 0.39 | 0.67 | 0.45 | 0.25 | 0.50 | 0.49      | 0.44 |
| 1971               | 0.01 | 0.43 | 0.43 | 0.45 | 0.53 | 0.45 | 0.54 | 0.54 | 0.73 | 0.53 | 0.38 | 0.51 | 0.51      | 0.51 |
| 1972               | 0.00 | 0.13 | 0.13 | 0.74 | 0.68 | 0.82 | 0.59 | 0.62 | 0.61 | 0.68 | 0.96 | 0.71 | 0.69      | 0.69 |
| 1973               | 0.00 | 0.22 | 0.22 | 0.35 | 0.45 | 0.64 | 0.61 | 0.53 | 0.71 | 0.62 | 1.40 | 0.54 | 0.54      | 0.60 |
| 1974               | 0.01 | 0.58 | 0.18 | 0.37 | 0.32 | 0.40 | 0.46 | 0.37 | 0.76 | 0.47 | 0.96 | 0.34 | 0.34      | 0.41 |
| 1975               | 0.01 | 0.31 | 0.36 | 0.40 | 0.43 | 0.58 | 0.49 | 0.37 | 0.50 | 0.54 | 0.58 | 0.44 | 0.44      | 0.55 |
| 1976               | 0.00 | 0.36 | 0.34 | 0.41 | 0.40 | 0.42 | 0.37 | 0.44 | 0.67 | 0.42 | 0.38 | 0.41 | 0.41      | 0.41 |
| 1977               | 0.00 | 0.34 | 0.36 | 0.73 | 0.64 | 0.59 | 0.54 | 0.44 | 0.48 | 0.54 | 0.54 | 0.58 | 0.57      | 0.54 |
| 1978               | 0.03 | 0.13 | 0.14 | 0.25 | 1.28 | 0.98 | 0.89 | 0.76 | 0.76 | 0.84 | 0.32 | 1.11 | 0.98      | 0.84 |
| 1979               | 0.00 | 0.21 | 0.12 | 0.28 | 0.16 | 0.92 | 0.78 | 1.08 | 0.75 | 0.83 | 0.64 | 0.61 | 0.68      | 0.90 |
| 1980               | 0.00 | 0.04 | 0.13 | 0.35 | 0.23 | 0.18 | 0.47 | 0.74 | 0.93 | 0.43 | 0.78 | 0.24 | 0.27      | 0.39 |
| 1981               | 0.00 | 0.09 | 0.21 | 0.25 | 0.66 | 0.45 | 0.15 | 0.57 | 0.49 | 0.41 | 0.13 | 0.63 | 0.63      | 0.41 |
| 1982               | 0.00 | 0.09 | 0.19 | 0.14 | 0.40 | 0.77 | 0.37 | 0.18 | 0.60 | 0.71 | 0.08 | 0.59 | 0.59      | 0.71 |
| 1983               | 0.00 | 0.12 | 0.18 | 0.53 | 0.22 | 0.47 | 0.91 | 0.49 | 0.22 | 0.65 | 0.12 | 0.55 | 0.55      | 0.67 |
| 1984               | 0.00 | 0.03 | 0.22 | 0.43 | 0.71 | 0.33 | 0.30 | 0.85 | 1.19 | 0.48 | 3.75 | 0.57 | 0.59      | 0.44 |
| 1985               | 0.01 | 0.06 | 0.15 | 0.46 | 0.56 | 0.46 | 0.35 | 0.45 | 0.63 | 0.45 | 0.17 | 0.52 | 0.51      | 0.43 |
| 1986               | 0.00 | 0.10 | 0.10 | 0.19 | 0.14 | 0.22 | 0.20 | 0.17 | 0.12 | 0.20 | 0.10 | 0.17 | 0.17      | 0.21 |
| 1987               | 0.00 | 0.11 | 0.13 | 0.28 | 0.24 | 0.17 | 0.20 | 0.20 | 0.19 | 0.18 | 0.09 | 0.22 | 0.22      | 0.18 |
| 1988               | 0.00 | 0.15 | 0.22 | 0.31 | 0.40 | 0.38 | 0.23 | 0.36 | 0.17 | 0.34 | 0.16 | 0.38 | 0.38      | 0.35 |
| 1989               | 0.00 | 0.10 | 0.17 | 0.18 | 0.20 | 0.27 | 0.20 | 0.14 | 0.23 | 0.23 | 0.16 | 0.23 | 0.23      | 0.23 |
| 1990               | 0.00 | 0.15 | 0.18 | 0.42 | 0.42 | 0.43 | 0.58 | 0.54 | 0.39 | 0.52 | 0.30 | 0.50 | 0.51      | 0.53 |
| 1991               | 0.00 | 0.12 | 0.22 | 0.43 | 0.39 | 0.35 | 0.40 | 0.49 | 0.42 | 0.42 | 0.63 | 0.38 | 0.41      | 0.42 |
| 1992               | 0.00 | 0.49 | 0.23 | 0.64 | 0.60 | 0.69 | 0.55 | 0.54 | 0.82 | 0.66 | 0.69 | 0.62 | 0.61      | 0.61 |
| 1993               | 0.00 | 0.13 | 0.23 | 0.62 | 0.69 | 0.76 | 0.78 | 0.81 | 0.77 | 0.77 | 0.27 | 0.72 | 0.73      | 0.77 |
| 1994               | 0.00 | 0.09 | 0.39 | 0.48 | 1.00 | 1.09 | 1.32 | 1.00 | 0.96 | 1.13 | 0.44 | 1.07 |           |      |
| 1995               | 0.00 | 0.19 | 0.27 | 0.61 | 0.71 | 1.04 | 1.32 | 0.93 | 0.91 | 1.10 | 0.14 | 0.94 | 0.94      | 1.11 |
| 1996               | 0.00 | 0.05 | 0.09 | 0.57 | 0.69 | 0.86 | 0.82 | 0.70 | 0.73 | 0.82 | 0.08 | 0.74 |           |      |
| 1997               | 0.00 | 0.09 | 0.16 | 0.27 | 0.66 | 0.55 | 0.71 | 0.97 | 0.41 | 0.61 | 0.06 | 0.65 |           |      |
| 1998               | 0.00 | 0.35 | 0.13 | 0.40 | 0.63 | 1.79 | 2.93 | 2.56 | 2.60 | 1.99 | 0.03 | 1.16 | 1.17      | 1.98 |
| 1999               | 0.00 | 0.28 | 0.57 | 0.51 | 0.84 | 0.98 | 1.00 | 1.08 | 1.66 | 0.99 | 0.00 | 0.89 | 0.89      | 0.99 |
| 2000               | 0.00 | 0.34 | 0.31 | 0.61 | 1.14 | 1.36 | 2.33 | 2.47 | 3.01 | 1.65 | 0.00 | 1.31 |           |      |
| 2001               | 0.00 | 0.15 | 0.58 | 0.40 | 0.85 | 1.10 | 2.20 | 3.12 | 2.32 | 1.45 | 0.00 | 1.06 | 1.08      | 1.45 |
|                    | 0.01 |      |      |      |      |      |      |      |      |      |      |      |           |      |
| 2003               | 0.00 | 0.40 | 0.90 | 0.73 | 2.06 | 1.46 | 2.90 | 2.29 | 2.86 | 0.00 | 0.00 | 2.03 | 2.03      | 1.90 |
| 2004               | 0.01 | 0.39 | 0.56 | 1.15 | 2.30 | 1.67 | 3.47 | 4.39 | 2.27 | 2.12 | 0.00 | 2.27 |           |      |
| 2005               | 0.00 | 0.18 | 0.37 | 0.64 | 0.82 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0    | 0.84 | 0.84      | 0.92 |
|                    |      |      |      |      |      |      |      |      |      |      |      |      |           |      |

Table 29. An evaluation of 2003-2005 fishery observations for the SW Nova Scotia/Bay of Fundy spawning component progress against biological objectives in the management plan for the fishery.

|    | Objective   | 2003: Met  | 2003: Not Met   | 2004: Observations   | 2005: Observations  |
|----|---|--|---|--|---|
| 1  | Maintain reproductive capacity                                |  |   |  |   |
| 1a | Persistence of all spawning components                        | German Bank and Scots<br>Bay OK; Trinity recovering          | Limited signs of Seal Island component Increased fishing on juveniles of mixed origin inconsistent with this objective                    | Trinity reduced from 2003;<br>no reports from Seal or<br>Lurcher areas                                 | Trinity Ledge remains at a low level; no reports of spawning in Seal Island or Lurcher Shoal areas  |
| 1b | Maintain biomass of each component                            | German Bank and Scots<br>Bay                                 | Trinity Ledge and Seal<br>Island  | No change  | German Bank and Scots Bay have declining biomass estimates. Trinity Ledge, Lurcher Shoal and Seal Island are at low biomass. Substantial decline in the acoustic index from 2004. |
| 1c | Maintain broad age composition                                |  | Not met in all areas Few<br>fish older than age 7; only<br>20% 4+. Rapid decline of<br>year-classes (including<br>strong 1998 year-class) | Further decline in proportion of older ages  | Further decline in proportion of older ages. Age composition is very narrow. Targeting of small fish was reduced in 2005.   |
| 1d | Maintain long spawning<br>period                              | German Bank and Scots<br>Bay                                 | Trinity and Seal Island   | Longer period for Scots  | Delayed start and shorter duration of spawning in 2005 for both Scots Bay and German Bank.  |
| 2  | Prevent growth over-<br>fishing                               |  |   |  | ,   |
| 2a | Fishing mortality at or below F0.1                            | Landings in recent years<br>less than 20% of surveyed<br>SSB | High total mortality and targeting of 2 year olds   | High exploitation rate for<br>Scots Bay. May be higher<br>than F0.1 if survey SSB is<br>overestimated. | Fishing mortality is high and well above F <sub>0.1</sub> .   |
| 3  | Maintain ecosystem<br>integrity / ecological<br>relationships |  |   |  |   |
| 3a | Maintain spatial and<br>temporal diversity of<br>spawning     | German Bank and Scots<br>Bay                                 | Insufficient spawning at<br>Seal Island and Trinity<br>Ledge  | No change.   | Insufficient spawning in some areas.  |
| 3b | Maintain biomass at moderate to high levels                   | Acoustic surveys indicate moderate SSB                       |   | Apparently no change but discrepancy with VPA results  | SSB is at lowest recorded level.  |

Table 30. 2005 4WX offshore herring fisheries catch at age in number (thousands) and weight (t).

a - Offshore Banks Purse Seine

|                  | Age 1 | Age 2 | Age 3 | Age 4 | Age 5  | Age 6 | Age 7 | Age 8 | Age 9 | Age 10 | Age 11+ | Total      |
|------------------|-------|-------|-------|-------|--------|-------|-------|-------|-------|--------|---------|------------|
| Numbers (x1,000) |       | -     | 814   | 8,872 | 10,777 | 1,965 | 593   | 44    | 22    | 10     |         | 23,098     |
| % numbers        | 0%    | 0%    | 4%    | 38%   | 47%    | 9%    | 3%    | 0%    | 0%    | 0%     | 0%      | 100%       |
| Catch wt. (t)    | -     | -     | 92    | 1,389 | 2,157  | 479   | 160   | 14    | 7     | 4      | -       | 4,303      |
| % catch wt.      | 0%    | 0%    | 2%    | 32%   | 50%    | 11%   | 4%    | 0%    | 0%    | 0%     | 0%      | 100%       |
| Avg. len (cm)    | -     | -     | 24.9  | 27.4  | 29.4   | 31.2  | 32.1  | 33.5  | 34.1  | 35.0   |         | 28.7 Avg.  |
| Avg. wt. (g)     | -     | -     | 113.5 | 156.6 | 200.2  | 243.6 | 270.5 | 314.3 | 334.5 | 365.5  |         | 186.3 Avg. |

b - Offshore Midwater Trawl

|                  | Age 1 | Age 2 | Age 3 | Age 4 | Age 5 | Age 6 | Age 7 | Age 8 | Age 9 | Age 10 | Age 11+ | Total         |
|------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|---------|---------------|
| Numbers (x1,000) | -     | -     | 258   | 3,030 | 2,212 | 357   | 80    |       | 3     | -      |         | 5,940         |
| % numbers        | 0%    | 0%    | 4%    | 51%   | 37%   | 6%    | 1%    | 0%    | 0%    | 0%     | 0%      | 100%          |
| Catch wt. (t)    | - 1   | -     | 28    | 409   | 361   | 69    | 17    | -     | 1     | -      | -       | 885           |
| % catch wt.      | 0%    | 0%    | 3%    | 46%   | 41%   | 8%    | 2%    | 0%    | 0%    | 0%     | 0%      | 100%          |
| Avg. len (cm)    | -     | -     | 25.4  | 27.4  | 29.2  | 31.0  | 31.9  |       | 33.5  |        |         | 28.3 Avg. Ler |
| Avg. wt. (g)     | -     | -     | 108.8 | 135.1 | 163.2 | 193.4 | 209.3 | -     | 241.0 |        |         | 149.0 Avg. wt |

c - 4WX Bottom Trawl & Misc. Gear Catches

|                  | Age 1 | Age 2 | Age 3 | Age 4 | Age 5 | Age 6 | Age 7 | Age 8 | Age 9 | Age 10 | Age 11+ | Total         |
|------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|---------|---------------|
| Numbers (x1,000) | 1     | 185   | 188   | 171   | 83    | 28    | 11    | 2     | 0     | 0      |         | 669           |
| % numbers        | 0%    | 28%   | 28%   | 26%   | 12%   | 4%    | 2%    | 0%    | 0%    | 0%     | 0%      | 100%          |
| Catch wt. (t)    | 0     | 7     | 16    | 25    | 16    | 7     | 3     | 1     | 0     | 0      |         | 75            |
| % catch wt.      | 0%    | 9%    | 22%   | 33%   | 22%   | 9%    | 4%    | 1%    | 0%    | 0%     | 0%      | 100%          |
| Avg. len (cm)    | 13.9  | 17.7  | 22.8  | 26.7  | 29.4  | 31.1  | 32.2  | 33.1  | 33.7  | 35.0   |         | 23.7 Avg. Le  |
| Avg. wt. (g)     | 17.2  | 37.7  | 87.7  | 144.9 | 199.0 | 238.0 | 264.6 | 288.8 | 310.9 | 365.5  |         | 112.1 Avg. wt |

Table 31. Herring larval abundance index from autumn Bay of Fundy plankton survey (average number of larvae per m<sup>2</sup> to bottom from 79 fixed location index stations).

|      | Larval He | erring Bong |      |    |
|------|-----------|-------------|------|----|
|      |           | No. per ma  |      |    |
| Year | Cruise    | Mean        | SE   | N  |
| 1972 | P109      | 9.4         | 1.8  | 79 |
| 1973 | P127      | 6.6         | 1.3  | 79 |
| 1974 | P147      | 49.5        | 10.9 | 79 |
| 1975 | P160      | 11.7        | 1.5  | 58 |
| 1976 | P175      | 13.5        | 2.9  | 79 |
| 1977 | P190      | 6.3         | 1.0  | 79 |
| 1978 | P207      | 4.5         | 0.5  | 77 |
| 1979 | P232      | 7.1         | 2.1  | 79 |
| 1980 | P246      | 26.2        | 6.7  | 79 |
| 1981 | P263      | 2.7         | 0.3  | 78 |
| 1982 | P280      | 10.6        | 1.2  | 77 |
| 1983 | P298      | 13.9        | 1.6  | 74 |
| 1984 | P315      | 12.7        | 1.4  | 78 |
| 1985 | P329      | 40.8        | 4.6  | 79 |
| 1986 | P344      | 18.9        | 2.1  | 78 |
| 1987 | P361      | 27.9        | 3.2  | 78 |
| 1988 | P377      | 100.7       | 11.5 | 76 |
| 1989 | P391      | 54.5        | 6.1  | 79 |
| 1990 | P408      | 27.2        | 3.1  | 79 |
| 1991 | P422      | 48.2        | 5.5  | 78 |
| 1992 | P437      | 57.0        | 6.4  | 79 |
| 1993 | P451      | 55.0        | 6.2  | 78 |
| 1994 | N211      | 5.4         | 0.7  | 77 |
| 1995 | N232      | 20.3        | 4.6  | 78 |
| 1996 | N252      | 9.5         | 1.6  | 77 |
| 1997 | N765      | 23.3        | 2.7  | 77 |
| 1998 | N865      | 33.6        | 3.8  | 77 |

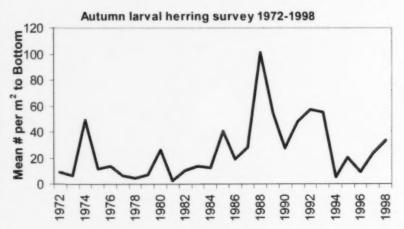


Table 32. Herring abundance indices from the July bottom trawl survey (stratified numbers per tow): 1970-2005.

|       | July ground trawl surv<br>4WX area combined |       |       |     | 4W Only      |       | 4X Only      |       | 4X BOF       |       | 4V only        |      | Offshore Ba  | anks |
|-------|---|-------|-------|-----|--------------|-------|--------------|-------|--------------|-------|----------------|------|--------------|------|
|       | strata 453/495                              |       |       |     | strata 453/4 | 166   | strata 470/4 | 195   | strata 480/4 | 195   | strata 442/452 | 2    | strata 455/4 | 78   |
| Year  | Cruise                                      | Mean# | SE    | N   | Mean#        | SE    | Mean#        | SE    | Mean#        | SE    | Mean#          | SE   | Mean#        | SE   |
| 1970  | A175/176                                    | 4.1   | 1.5   | 95  | 4.9          | 2.4   | 1.6          | 0.6   | 1.0          | 0.6   | 12.8           | 9.8  | 5.7          | 2.   |
| 1971  | A188/189                                    | 4.0   | 1.9   | 86  | 2.6          | 1.2   | 3.6          | 2.6   | 1.4          | 1.0   | 4.4            | 4.4  | 5.3          | 2.   |
| 1972  | A200/201                                    | 1.4   | 0.6   | 105 | 1.7          | 1.0   | 0.5          | 0.1   | 0.3          | 0.1   | 4.5            | 3.7  | 2.0          | 1.6  |
| 1973  | A212/213                                    | 0.9   | 0.3   | 96  | 0.4          | 0.3   | 1.0          | 0.4   | 1.0          | 0.4   | 19.2           | 19.2 | 0.9          | 0.   |
| 1974  | A225/226                                    | 0.7   | 0.3   | 102 | 0.2          | 0.0   | 1.0          | 0.4   | 1.4          | 0.6   | 0.0            | 0.0  | 0.5          | 0.   |
| 1975  | A236/237                                    | 0.9   | 0.4   | 104 | 0.8          | 0.4   | 0.7          | 0.4   | 1.3          | 0.7   | 2.2            | 2.2  | 0.7          | 0.   |
| 1976  | A250/251                                    | 0.4   | 0.2   | 103 | 0.1          | 0.1   | 0.5          | 0.3   | 0.9          | 0.6   | 0.0            | 0.0  | 0.1          | 0.   |
| 1977  | A265/266                                    | 0.5   | 0.3   | 106 | 0.0          | 0.0   | 0.8          | 0.5   | 1.5          | 0.9   | 1.6            | 1.4  | 0.1          | 0.   |
| 1978  | A279/280                                    | 0.3   | 0.3   | 103 | 0.5          | 0.5   | 0.1          | 0.0   | 0.1          | 0.0   | 0.0            | 0.0  | 0.5          | 0.   |
| 1979  | A292/293                                    | 0.6   | 0.5   | 106 | 0.0          | 0.0   | 1.0          | 0.7   | 1.5          | 1.3   | 0.0            | 0.0  | 0.2          | 0.   |
| 1980  | A306/307                                    | 0.5   | 0.5   | 105 | 0.0          | 0.0   | 0.8          | 0.8   | 1.6          | 1.6   | 0.0            | 0.0  | 0.0          | 0.   |
| 1981  | A321/322                                    | 1.5   | 1.4   | 104 | 0.0          | 0.0   | 2.3          | 2.1   | 4.6          | 4.1   | 0.0            | 0.0  | 0.0          | 0.   |
| 1982  | 11080/081                                   | 1.5   | 0.9   | 108 | 0.5          | 0.3   | 1.9          | 1.4   | 0.8          | 0.3   | 0.0            | 0.0  | 2.5          | 1.   |
| 1983  | N012/013                                    | 2.4   | 0.8   | 106 | 2.6          | 1.2   | 2.2          | 1.0   | 3.1          | 1.6   | 0.1            | 0.0  | 2.1          | 1.   |
| 1984  | N031/032                                    | 7.0   | 3.5   | 102 | 3.3          | 1.2   | 10.5         | 6.8   | 4.6          | 2.5   | 4.0            | 2.9  | 8.5          | 5    |
| 1985  | N048/049                                    | 3.4   | 1.8   | 111 | 6.6          | 3.8   | 0.3          | 0.1   | 0.4          | 0.2   | 0.0            | 0.0  | 5.0          | 2    |
| 1986  | N065/066                                    | 23.2  | 14.9  | 118 | 30.8         | 26.7  | 16.0         | 14.3  | 24.9         | 22.3  | 0.5            | 0.4  | 23.4         | 20.  |
| 1987  | N85/86/87                                   | 10.4  | 5.6   | 135 | 17.0         | 11.3  | 4.0          | 1.8   | 6.3          | 2.8   | 117.4          | 90.5 | 12.9         | 8.   |
| 1988  | N105/106                                    | 2.1   | 0.6   | 127 | 2.7          | 1.2   | 1.5          | 0.5   | 2.3          | 0.8   | 0.3            | 0.2  | 2.0          | 0.   |
| 1989  | N123/124                                    | 8.4   | 1.8   | 124 | 11.8         | 3.4   | 4.5          | 1.2   | 4.9          | 1.4   | 3.6            | 3.1  | 9.8          | 2    |
| 1990  | N139/140                                    | 5.6   | 1.9   | 156 | 7.4          | 3.6   | 3.4          | 1.0   | 3.4          | 0.8   | 0.3            | 0.2  | 6.5          | 2    |
| 1991  | N154/H231                                   | 10.6  | 5.8   | 137 | 13.0         | 8.8   | 5.0          | 1.8   | 4.9          | 2.3   | 10.2           | 9.9  | 14.3         | 9    |
| 1992  | N173/174                                    | 16.5  | 4.9   | 136 | 16.2         | 6.6   | 40.8         | 15.7  | 41.8         | 22.2  | 0.2            | 0.1  | 23.6         | 7    |
| 1993  | N189/190                                    | 18.7  | 4.5   | 137 | 6.3          | 2.5   | 30.4         | 8.5   | 27.6         | 10.3  | 1.0            | 0.6  | 15.0         | 4    |
| 1994  | N221/222                                    | 76.4  | 30.2  | 140 | 108.4        | 58.9  | 45.9         | 18.4  | 51.1         | 26.0  | 25.7           | 22.0 | 91.1         | 45.  |
| 1995  | N226/227                                    | 63.5  | 24.2  | 140 | 100.5        | 47.9  | 28.4         | 12.8  | 11.4         | 5.4   | 7.9            | 6.1  | 92.7         | 37.  |
| 1996  | N246/247                                    | 40.2  | 14.2  | 135 | 53.2         | 24.5  | 27.1         | 14.1  | 32.1         | 20.8  | 0.2            | 0.1  | 46.5         | 19.  |
| 1997  | N726/734                                    | 31.8  | 15.3  | 137 | 34.6         | 10.1  | 51.3         | 39.3  | 72.8         | 60.9  | 0.2            | 0.1  | 29.3         | 7.   |
| 1998  | N827/832                                    | 99.52 | 20.65 | 131 | 147.6        | 39.92 | 54.76        | 14.5  | 45.6         | 19.4  | 0.8            | 0.3  | 130.3        | 30.  |
| 1999  | N925/929                                    | 229.8 | 83.8  | 133 | 264.2        | 101.0 | 199,4        | 130.2 | 251.4        | 203.6 | 24.9           | 15.2 | 226.2        | 74   |
| 2000  | N426/431                                    | 90.6  | 20.0  | 146 | 146.3        | 40.6  | 38.7         | 7.4   | 29.5         | 9,1   | 2.0            | 0.6  | 124.7        | 30   |
| 2001  | N2001-032/037                               | 145.9 | 47.7  | 139 | 152.7        | 81.3  | 139.5        | 52.5  | 181.3        | 80.9  | 53.9           | 49.2 | 132.4        | 60.  |
| 2002  | N2002-037/040                               | 161.9 | 48.6  | 147 | 172.7        | 81.3  | 151.9        | 55.6  | 170.9        | 85.3  | 4.9            | 2.6  | 162.6        | 61.  |
| 2003  | N2003-036/042                               | 130.6 | 70.5  | 153 | 207.8        | 145.4 | 58.7         | 14.5  | 50.3         | 14.0  | 4.9            | 2.0  | 175.8        | 108  |
| 20041 | TEL2004-529/530                             | 295.9 | 100.2 | 205 | 307.6        | 134.5 | 285.0        | 147.4 | 198.0        | 170.9 | 1.4            | 0.4  | 355.6        | 127  |
| 20051 | TEL2005-605/633                             | 74.1  | 13.7  | 118 | 13.7         | 8.7   | 130.5        | 23.1  | 51.8         | 34.4  | 7.4            | 2.2  | 88.0         | 6    |
| 2005n | NED2005-027/034                             | 63.1  | 20.9  | 150 | 36.0         | 13.1  | 88.2         | 38.5  | 61.0         | 30.2  | 13.6           | 5.4  | 66.2         | 28   |

Table 33. Stratified mean numbers per tow by age of herring for NAFO unit areas 4WX (strata 53/95) from the DFO July bottom trawl research survey, 1970-2005.

| Year | 1    | 2    | 3    | 4    | 5    | 6    | 7   | 8   | 9   | 10 11+ | U   | nkown | TOTAL |
|------|------|------|------|------|------|------|-----|-----|-----|--------|-----|-------|-------|
| 1970 |      |      | 0.1  | 1.6  | 1.2  | 0.8  | 0.2 | 0.1 | 0.0 |        |     |       | 4.0   |
| 1971 |      |      | 0.4  | 0.8  | 1.3  | 0.7  | 0.5 | 0.0 | 0.0 | 0.0    | 0.0 | 0.1   | 3.9   |
| 1972 |      | 0.1  | 0.0  | 0.2  | 0.3  | 0.4  | 0.2 | 0.1 | 0.0 | 0.0    | 0.0 | 0.1   | 1.4   |
| 1973 |      |      | 0.1  | 0.1  | 0.2  | 0.2  | 0.1 | 0.1 | 0.1 | 0.0    | 0.0 | 0.1   | 0.9   |
| 1974 |      | 0.0  | 0.1  | 0.5  | 0.1  | 0.1  | 0.0 | 0.0 | 0.0 | 0.0    | 0.0 | 0.0   | 0.8   |
| 1975 |      | 0.0  | 0.1  | 0.2  | 0.3  | 0.1  | 0.0 | 0.0 | 0.0 | 0.0    | 0.1 |       | 0.9   |
| 1976 |      | 0.0  | 0.0  | 0.2  | 0.0  | 0.1  | 0.0 | 0.0 | 0.0 | 0.0    | 0.0 |       | 0.4   |
| 1977 |      | 0.0  | 0.0  | 0.1  | 0.1  | 0.0  | 0.0 | 0.0 | 0.0 |        |     | 0.3   | 0.5   |
| 1978 | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.1 | 0.2 | 0.0 | 0.0    | 0.0 |       | 0.4   |
| 1979 |      | 0.0  | 0.4  | 0.1  | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0    | 0.0 |       | 0.6   |
| 1980 | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |     |     |     |        |     | 0.5   | 0.5   |
| 1981 | 0.1  | 0.1  | 0.4  | 0.7  | 0.2  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0    |     | 0.0   | 1.5   |
| 1982 |      | 0.1  | 0.3  | 0.3  | 0.7  | 0.4  | 0.0 | 0.0 | 0.0 | 0.0    | 0.0 | 0.0   | 1.9   |
| 1983 | 0.0  | 0.6  | 0.2  | 0.6  | 0.1  | 0.3  | 0.3 | 0.1 | 0.0 | 0.0    | 0.0 | 0.0   | 2.4   |
| 1984 | 0.0  | 0.1  | 0.4  | 0.8  | 1.2  | 0.3  | 0.3 | 0.3 | 0.0 | 0.1    | 3.5 | 0.0   | 7.0   |
| 1985 |      | 0.1  | 0.2  | 1.1  | 1.0  | 0.6  | 0.2 | 0.2 | 0.1 | 0.0    | 0.0 | 0.0   | 3.4   |
| 1986 |      | 0.2  | 7.2  | 7.2  | 4.7  | 2.4  | 1.1 | 0.2 | 0.1 | 0.1    | 0.1 | 0.0   | 23.4  |
| 1987 | 0.0  | 1.0  | 3.7  | 2.7  | 1.1  | 0.8  | 0.4 | 0.3 | 0.2 | 0.1    | 0.1 |       | 10.4  |
| 1988 |      | 0.3  | 0.1  | 0.4  | 0.7  | 0.4  | 0.1 | 0.0 | 0.0 | 0.0    | 0.0 | 0.0   | 2.1   |
| 1989 | 0.2  | 0.2  | 0.4  | 0.8  | 1.0  | 2.9  | 1.7 | 0.3 | 0.1 | 0.1    | 0.1 | 0.1   | 8.0   |
| 1990 | 0.1  | 0.2  | 0.6  | 0.8  | 0.7  | 0.7  | 1.3 | 0.7 | 0.1 | 0.0    | 0.1 | 0.0   | 5.3   |
| 1991 |      | 0.1  | 0.5  | 1.6  | 1.9  | 1.1  | 1.6 | 2.7 | 0.9 | 0.2    | 0.1 | 0.0   | 10.9  |
| 1992 |      | 11.6 | 1.3  | 1.8  | 2.8  | 4.1  | 2.1 | 1.9 | 2.6 | 0.6    | 0.3 | 0.1   | 29.1  |
| 1993 |      | 0.1  | 0.8  | 3.1  | 4.2  | 4.1  | 3.1 | 1.3 | 0.9 | 0.8    | 0.4 |       | 18.8  |
| 1994 |      | 0.1  | 5.1  | 9.5  | 23.2 | 18.4 | 7.0 | 0.5 | 1.4 | 3.4    | 1.2 | 6.1   | 75.8  |
| 1995 | 0.0  | 0.5  | 10.7 | 13.1 | 9.4  | 13.8 | 9.2 | 3.3 | 1.6 | 1.0    | 1.3 | 0.1   | 63.9  |
| 1996 | 0.0  | 0.3  | 1.8  | 19.1 | 7.9  | 5.3  | 3.2 | 1.1 | 0.3 | 0.2    | 0.2 | 0.0   | 39.4  |
| 1997 | 1.2  | 20.0 | 1.8  | 5.7  | 9.1  | 2.0  | 1.2 | 0.6 | 0.2 | 0.1    | 0.3 | 0.9   | 43.2  |
| 1998 | 0.1  | 1.5  | 2.4  | 22.0 | 37.8 | 28.4 | 5.2 | 1.4 | 0.4 | 0.2    | 0.2 | 0.0   | 99.5  |
| 1999 | 0.2  | 7.3  | 59.5 | 32.6 | 92.9 | 29.8 | 2.3 | 0.1 | 0.0 | 0.0    |     | 0.1   | 224.7 |
| 2000 | 0.1  | 1.2  | 9.1  | 31.7 | 30.8 | 13.2 | 4.0 | 0.4 | 0.0 | 0.0    |     | 0.0   | 90.6  |
| 2001 |      | 5.3  | 95.0 | 14.1 | 22.7 | 7.2  | 1.3 | 0.1 | 0.0 |        |     | 0.0   | 145.8 |
| 2002 | 1.8  | 34.9 | 41.8 | 56.9 | 18.4 | 5.1  | 2.4 | 0.4 | 0.0 | 0.0    |     | 0.2   | 161.9 |
| 2003 | 0.2  | 4.5  | 23.5 | 56.8 | 37.5 | 5.5  | 1.9 | 0.0 |     |        |     | 0.7   | 130.6 |
| 2004 | 47.5 | 2.2  | 64.3 | 99.7 | 69.5 | 4.1  | 2.6 | 0.2 | 0.0 |        |     | 5.9   | 295.9 |
| 2005 |      | 0.2  | 17.7 | 34.0 | 9.7  | 0.6  | 0.2 | 0.0 |     |        |     | 0.7   | 63.0  |

Table 34. Recorded landings (t) of herring from gillnet fisheries on the Coastal Nova Scotia Spawning component, 1996-2005.

| Landings (t)            | 1996  | 1997  | 1998  | 1999  | 2000  | 2001  | 2002   | 2003  | 2004  |       | Avg. Catch<br>Last 5 yr. | Avg. Catch<br>All Years |
|-------------------------|-------|-------|-------|-------|-------|-------|--------|-------|-------|-------|--------------------------|-------------------------|
| Little Hope/Port Mouton |       | 490   | 1,170 |       |       | 2,904 |        | 4,526 |       |       |                          | 2,393                   |
| Halifax/Eastern Shore   | 1,280 |       |       |       |       | 1,898 |        | 2,727 |       |       |                          | 2,246                   |
| Glace Bay               |       | 170   | 1,730 | 1,040 | 834   | 1,204 | 3,058  | 1,905 | 1,481 | 626   | 1,518                    | 1,339                   |
| Bras d'Or Lakes¹        | 170   | 160   | 120   | 31    | 56    | 0     | 1      | 4     |       |       | 15                       | 68                      |
| Total                   | 1,450 | 2,340 | 4,120 | 5,618 | 4,283 | 6,006 | 10,375 | 9,162 | 6,924 | 6,311 | 7,177                    | 5,659                   |

<sup>&#</sup>x27;Bras d'Or Lakes fishery closed in 2004

Table 35. Summary of the estimated spawning biomass of herring from gillnet fisheries in the Coastal Nova Scotia Spawning component from 1998-2005. Total SSB is rounded to nearest 100t.

|                            |      |      |        |        |        |        |        |        |        |        | 10% SSB    | 10% SSB   |
|----------------------------|------|------|--------|--------|--------|--------|--------|--------|--------|--------|------------|-----------|
| Survey SSB (t) without CIF | 1996 | 1997 | 1998   | 1999   | 2000   | 2001   | 2002   | 2003   | 2004   | 2005   | Last 5 yr. | All Years |
| Little Hope/Port Mouton    |      |      | 14,100 | 15,800 | 5,200  | 21,300 | 56,000 | 63,700 | 15,600 | 39,500 | 3,355      | 2,890     |
| Halifax/Eastern Shore      |      |      | 8,300  | 20,200 | 10,900 | 16,700 | 41,500 | 77,400 | 18,200 | 28,100 | 3,213      | 2,766     |
| Glace Bay                  |      |      |        | 2,000  |        | 21,200 | 7,700  | 31,500 |        | 2,200  | 1,565      | 1,292     |
| Bras d'Or Lakes            |      |      |        | 530    | 70     |        |        |        |        |        | 7          | 30        |

Table 36. Summary of the exploitation of herring from major gillnet fisheries in the Coastal Nova Scotia Spawning component from 1998-2005. Exploitation is calculated percent landings / SSB.

| Exploitation (% Landings/SSB) | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 |     | 3   | Average %<br>All Years |
|-------------------------------|------|------|------|------|------|------|------|------|------|-----|-----|------------------------|
| Little Hope/Port Mouton       |      |      | 8%   | 18%  | 39%  | 14%  | 7%   | 7%   | 8%   | 6%  | 13% | 13%                    |
| Halifax/Eastern Shore         |      |      | 13%  | 8%   | 12%  | 11%  | 8%   | 4%   | 23%  | 12% | 12% | 11%                    |
| Glace Bay                     |      |      |      | 52%  |      | 6%   | 40%  | 6%   |      | 28% | 20% | 26%                    |
| Bras d'Or Lakes               |      |      |      | 6%   | 80%  |      |      |      |      |     | 80% | 43%                    |

Table 37. Catch at age for herring from the coastal Nova Scotia fisheries in 2005.

4X Little Hope/Port Mouton Gillnet

|                  | Age 1 | Age 2 | Age 3 | Age 4 | Age 5 | Age 6 | Age 7 | Age 8 | Age 9 | Age 10 | Age 11+ | Tota   |
|------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|---------|--------|
| Numbers (x1,000) | -     | -     | 10    | 1,316 | 5.062 | 3,027 | 926   | 138   | 64    | Age IV | Aue 117 | Tota   |
| % numbers        | 0%    | 0%    | 0%    | 12%   | 48%   | 29%   | 9%    | 1%    | 1%    | 0%     | 0%      | 10,545 |
| Catch wt. (t)    | -     | -     | 1     | 219   | 1,011 | 709   | 239   | 40    | 19    | 0 76   | 0%      | 100%   |
| % catch wt.      | 0%    | 0%    | 0%    | 10%   | 45%   | 32%   | 11%   | 2%    | 1%    | 0%     | 0%      | 2,239  |
| Avg. len (cm)    | -     | -     | 26.0  | 28.0  | 29.6  | 31.1  | 32.0  | 33.2  | 33.5  | 0 70   | 076     | 30.1   |
| Avg. wt. (g)     | -     |       | 130.2 | 166.7 | 199.6 | 234.3 | 258.1 | 290.6 | 298.8 | .      |         | 212.3  |

4W Halifax/Eastern Shore Gillnet

|                  | Age 1 | Age 2 | Age 3 | Age 4 | Age 5 | Age 6 | Age 7 | Age 8 | Age 9 | Age 10 | Ann 114 | Total  |
|------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|---------|--------|
| Numbers (x1,000) | -     | -     | 1     | 591   | 5.521 | 4.928 | 3.330 | 506   | 12    | Age 10 | Age 11+ | Total  |
| % numbers        | 0%    | 0%    | 0%    | 4%    | 37%   | 33%   |       |       | 13    | *      | -       | 14,891 |
| Catch wt. (t)    | 0 70  | 0 70  | 0 70  |       |       |       | 22%   | 3%    | 0%    | 0%     | 0%      | 100%   |
|                  |       |       | 0     | 100   | 1,136 | 1,176 | 885   | 145   | 5     | -      | -       | 3,446  |
| % catch wt.      | 0%    | 0%    | 0%    | 3%    | 33%   | 34%   | 26%   | 4%    | 0%    | 0%     | 0%      | 100%   |
| Avg. len (cm)    | -     | -     | 26.0  | 28.0  | 29.8  | 31.2  | 32.2  | 33.1  | 35.0  |        |         | 30.9   |
| Avg. wt. (g)     | -     | -     | 132.7 | 168.7 | 205.7 | 238.5 | 265.7 | 287.3 | 354.8 |        |         | 231.4  |

4Vn Gillnet Glace Bay

|                  | Age 1 | Age 2 | Age 3 | Age 4 | Age 5 | Age 6 | Age 7 | Age 8 | Age 9 | Ago 10 | Age 11+ | Total |
|------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|---------|-------|
| Numbers (x1,000) |       | -     |       | 17    | 402   | 859   |       |       |       | Age IU | Age 11+ | Total |
|                  | 00/   | 001   |       | 17    |       |       | 995   | 136   | 34    | -      | -       | 2,443 |
| % numbers        | 0%    | 0%    | 0%    | 1%    | 16%   | 35%   | 41%   | 6%    | 1%    | 0%     | 0%      | 100%  |
| Catch wt. (t)    | -     | -     | -     | 3     | 89    | 210   | 268   | 43    | 12    | . 70   | 0 70    |       |
| % catch wt.      | 0%    | 0%    | 0%    | 0%    | 14%   | 34%   | 43%   | 7%    | 2%    |        | - 004   | 626   |
| Avg. len (cm)    |       |       |       |       |       |       |       |       |       | 0%     | 0%      | 100%  |
|                  |       | ^     |       | 27.0  | 30.4  | 31.3  | 32.2  | 33.8  | 35.3  | -      |         | 31.7  |
| Avg. wt. (g)     | -     | -     | -     | 150.4 | 222.8 | 244.8 | 269.6 | 316.6 | 363.4 | - 1    |         | 256.3 |

Table 38. New Brunswick weir and shutoff catch at age for herring in 2005.

## NB Weir and Shutoff combined for 2005

Catch at age (numbers and weight)

|                  | Age 1 | Age 2   | Age 3  | Age 4  | Age 5 | Age 6 | Age 7 | Age 8 | Age 9 | Age 10 | Age 11+ | Total   |
|------------------|-------|---------|--------|--------|-------|-------|-------|-------|-------|--------|---------|---------|
| Numbers (x1,000) | 1,117 | 102,227 | 76,137 | 21,310 | 1,182 | 63    | 7     | -     | -     |        |         | 202,044 |
| % numbers        | 1%    | 51%     | 38%    | 11%    | 1%    | 0%    | 0%    | 0%    | 0%    | 0%     | 0%      | 100%    |
| Catch wt. (t)    | 22    | 3,898   | 6,090  | 2,805  | 223   | 15    | 2     | -     | -     | -      |         | 13,055  |
| % catch wt.      | 0%    | 30%     | 47%    | 21%    | 2%    | 0%    | 0%    | 0%    | 0%    | 0%     | 0%      | 100%    |
| Avg. len (cm)    | 14.0  | 17.7    | 22.1   | 25.8   | 28.9  | 30.7  | 31.8  | -     | -     | -      |         | 20.2    |
| Avg. wt. (g)     | 19.3  | 38.1    | 80.0   | 131.6  | 188.5 | 229.9 | 259.1 | -     | -     |        |         | 64.6    |

## NB Weirs (only) for 2005

Catch at age (numbers and weight)

|                  | Age 1 | Age 2  | Age 3  | Age 4  | Age 5 | Age 6 | Age 7 | Age 8 | Age 9 | Age 10 | Age 11+ | Total   |
|------------------|-------|--------|--------|--------|-------|-------|-------|-------|-------|--------|---------|---------|
| Numbers (x1,000) | 372   | 94,460 | 75,008 | 21,175 | 1,170 | 63    | 7     | -     | -     | -      |         | 192,257 |
| % numbers        | 0%    | 49%    | 39%    | 11%    | 1%    | 0%    | 0%    | 0%    | 0%    | 0%     | 0%      | 100%    |
| Catch wt. (t)    | 7     | 3,594  | 6,013  | 2,789  | 221   | 15    | 2     | -     | -     | -      |         | 12,640  |
| % catch wt.      | 0%    | 28%    | 48%    | 22%    | 2%    | 0%    | 0%    | 0%    | 0%    | 0%     | 0%      | 100%    |
| Avg. len (cm)    | 13.8  | 17.6   | 22.1   | 25.8   | 28.9  | 30.7  | 31.8  |       | -     | -      |         | 20.4    |
| Avg. wt. (g)     | 17.7  | 38.1   | 80.2   | 131.7  | 188.6 | 229.9 | 259.1 |       | -     | -      |         | 65.7    |

## NB Shutoff (only) for 2005

Catch at age (numbers and weight)

|                  | Age 1 | Age 2 | Age 3 | Age 4 | Age 5 | Age 6 | Age 7 | Age 8 | Age 9 | Age 10 | Age 11+ | Tota  |
|------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|---------|-------|
| Numbers (x1,000) | 745   | 7,766 | 1,129 | 135   | 12    | -     |       |       | -     |        | -       | 9,787 |
| % numbers        | 8%    | 79%   | 12%   | 1%    | 0%    | 0%    | 0%    | 0%    | 0%    | 0%     | 0%      | 100%  |
| Catch wt. (t)    | 15    | 304   | 77    | 17    | 2     | -     | -     |       | -     | -      | -       | 415   |
| % catch wt.      | 4%    | 73%   | 19%   | 4%    | 1%    | 0%    | 0%    | 0%    | 0%    | 0%     | 0%      | 100%  |
| Avg. len (cm)    | 14.1  | 17.8  | 21.1  | 25.4  | 28.8  | -     | -     | -     | -     |        |         | 18.0  |
| Avg. wt. (g)     | 20.0  | 39.2  | 68.3  | 123.3 | 187.2 | -     | -     | -     | -     |        |         | 42.4  |

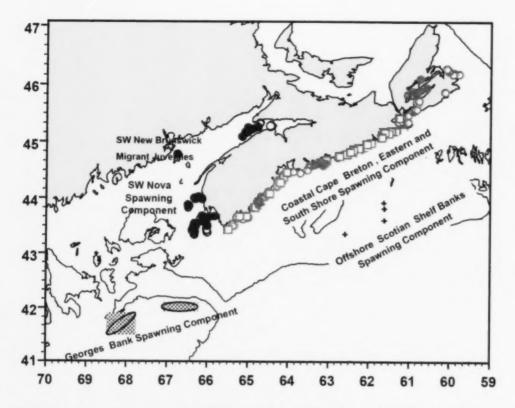


Figure 1. Management units for herring in areas 4VWX and 5YZ showing locations of known current (solid) and historical (open) spawning locations.

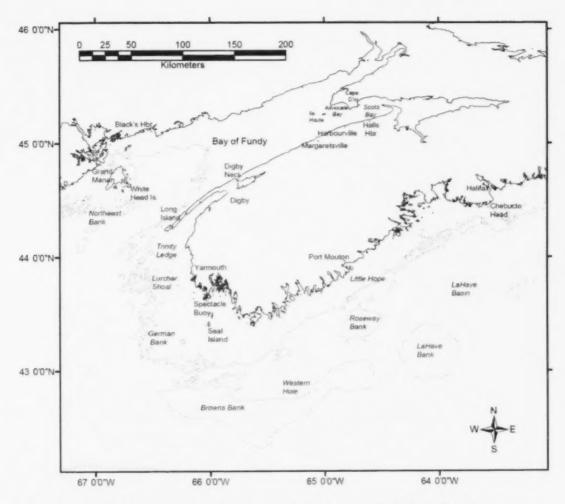


Figure 2. Fishing locations for herring in southwest and coastal Nova Scotia.

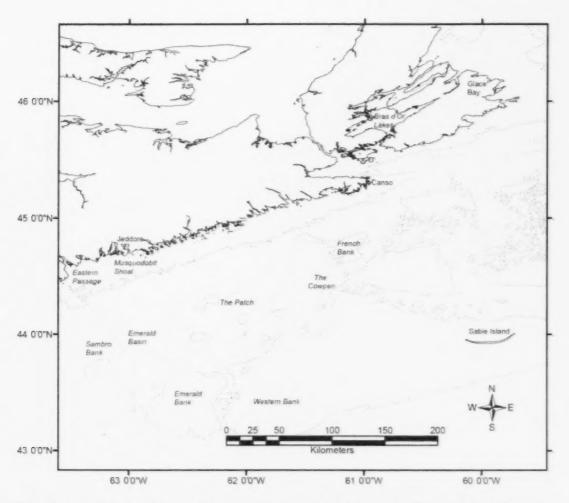


Figure 3. Fishing locations for herring on the eastern Scotian Shelf and offshore banks.

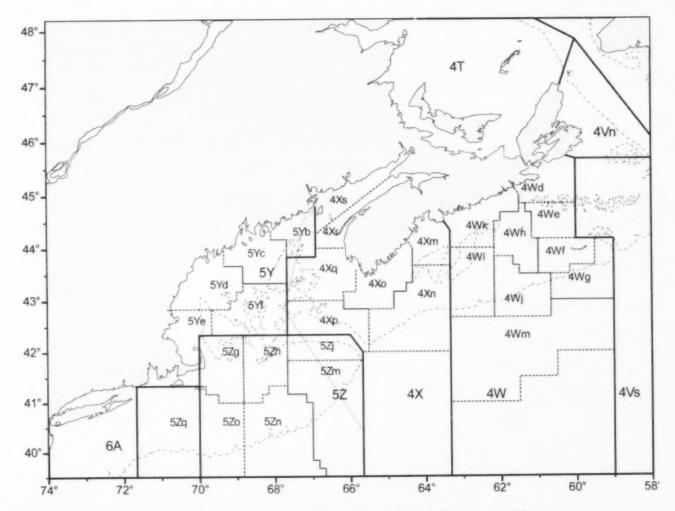


Figure 4. Major and minor NAFO unit areas used for sample and catch data aggregation.

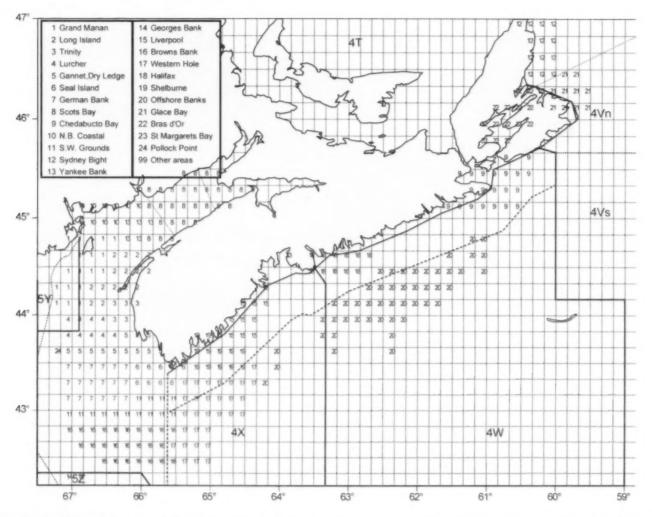


Figure 5. Herring fishing ground areas by 10 mile boxes and management lines for NAFO areas, 25 mile offshore line, coastal embayment line and herring area lines.

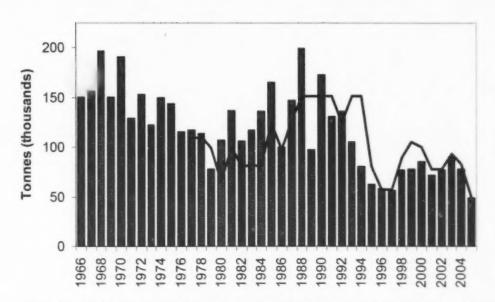


Figure 6. Annual herring landings [bars] and TAC [solid line] (quota) for the southwest Nova Scotia spawning component (4WX stock).

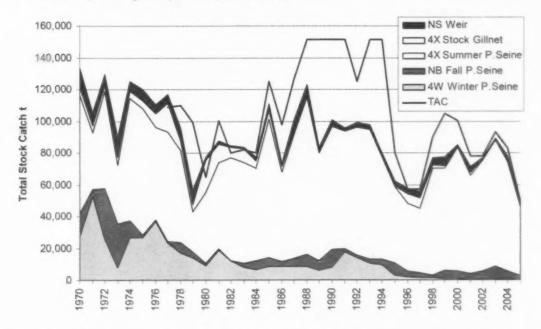
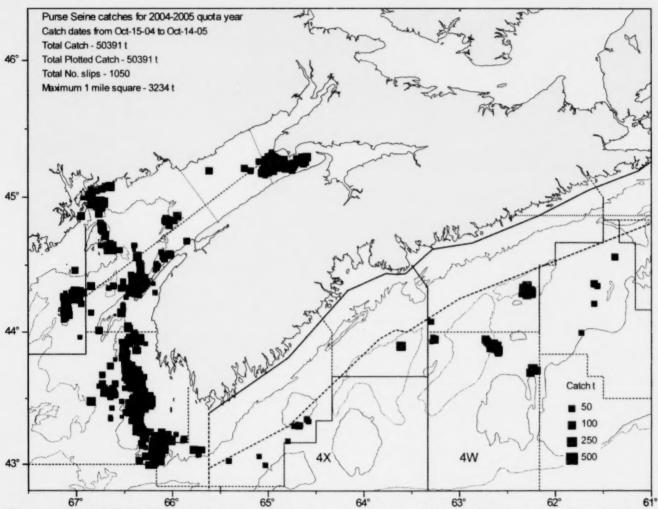


Figure 7. Annual herring landings by gear component for the southwest Nova Scotia spawning component (4WX stock).



67° 66° 65° 64° 63° 62° 61° Figure 8. Overall 2004-2005 quota year herring purse seine catches (t) for NAFO areas 4WX (from Statistics Division MARFIS database).

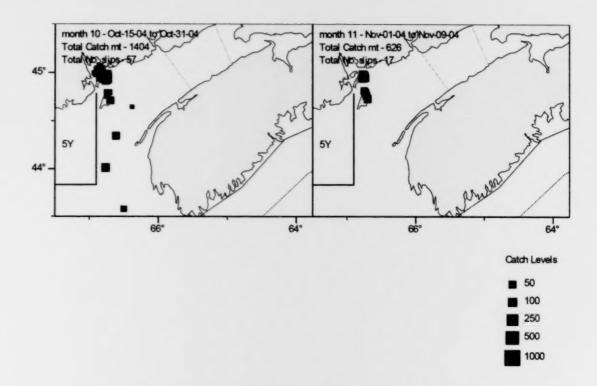


Figure 9. 2004 fall fishery herring purse seine catches (t) by month in NAFO areas 4WX from 2004-2005 quota year (from Statistics Division MARFIS database).

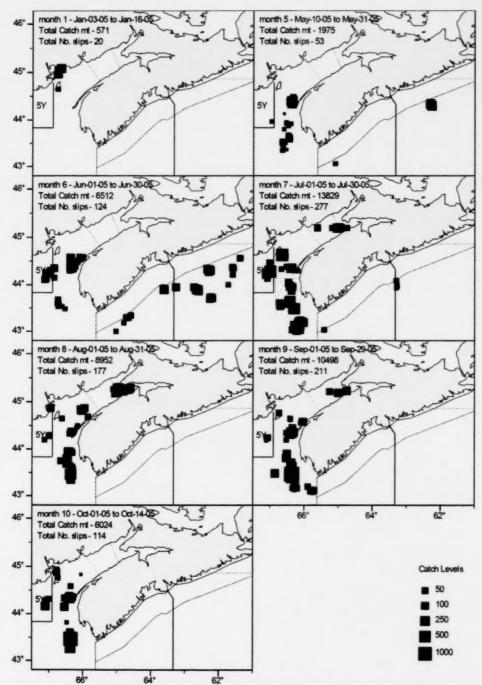


Figure 10. 2005 herring purse seine catches (t) by month in NAFO areas 4WX from 2004-2005 quota year (from Statistics Division MARFIS database).

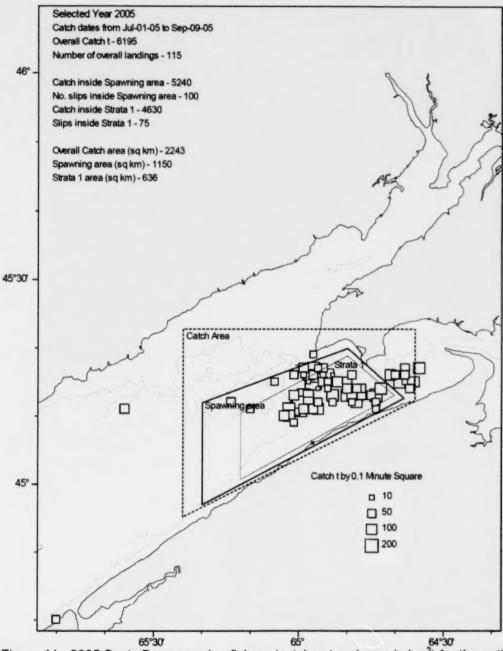


Figure 11. 2005 Scots Bay spawning fishery (catches t and area in km²) for the entire fishing period in the selected 'Catch Area', 'Spawning Area' and the primary acoustic survey area (Stratum 1).

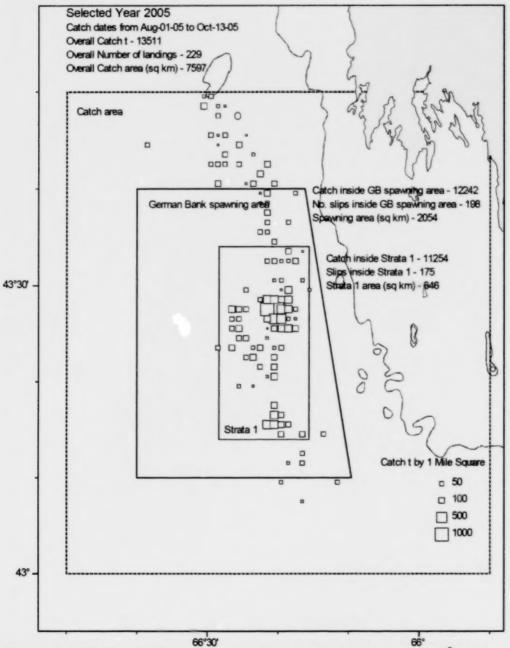


Figure 12. 2005 German Bank spawning fishery (catches t and area in km²) for the spawning period Aug. 1 to Oct. 15, 2005 in the selected 'Catch Area', 'Spawning Area' and the primary acoustic survey area (Stratum 1).

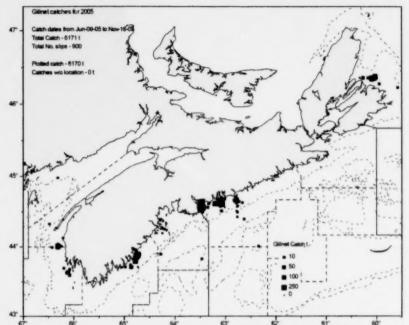


Figure 13. Herring set and drift gillnet catches (t) for 2005 calendar year for NAFO areas 4VWX (data from Statistics Division MARFIS database).

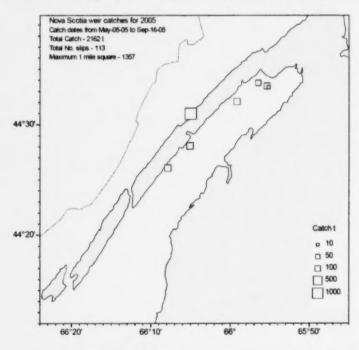


Figure 14. Nova Scotia herring weir catches for the 2005 calendar year.

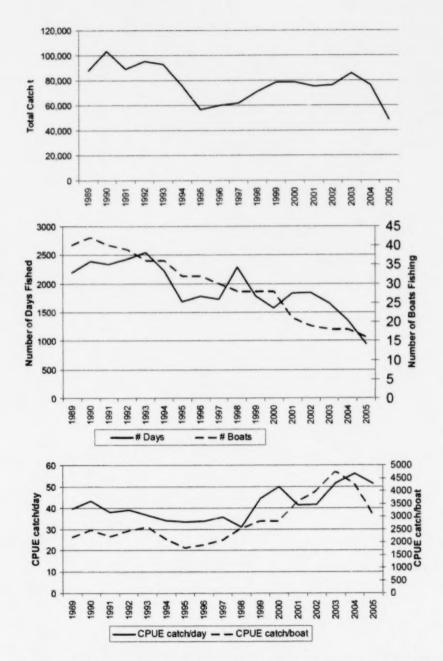


Figure 15. Purse seine catch (top panel), effort (middle panel) and CPUE (bottom) from 1989 to 2005 annual 4WX herring landings data for the SW Nova Scotia/Bay of Fundy spawning component.

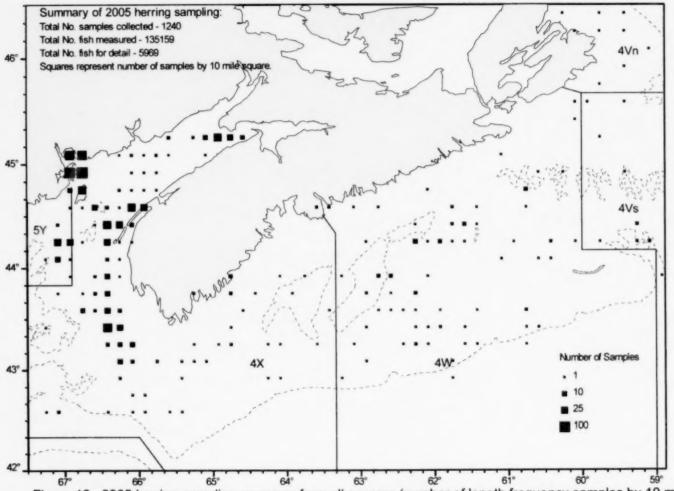


Figure 16. 2005 herring sampling coverage from all sources (number of length frequency samples by 10 mile square).

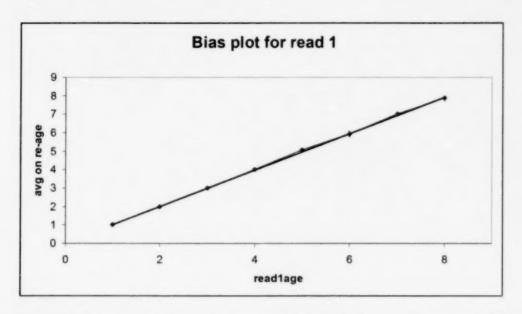


Figure 17. Bias plot of the first and second reading of herring otoliths from the 2005 4VWX fishery (random sample of 143 otoliths). The mean CV was 1.45%

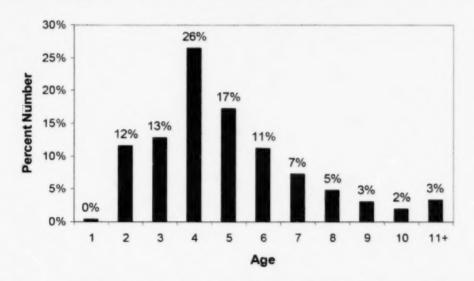


Figure 18. Expected age structure in the fishery with fishing at  $F_{0.1}$  and constant average recruitment. Parameters: long-term F=0.23, annual recruitment=1.8 billion, natural mortality=0.2, partial recruitment vector=0.006, 0.235, 0.339 and 1 for ages 1, 2, 3 and 4+, respectively.

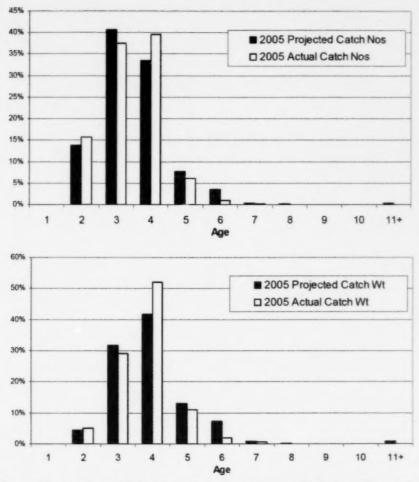


Figure 19. Projected 2005 age structure based on fishing at  $F_{0.1}$  and actual 2005 catch in percent numbers (top panel) and percent weight (bottom panel).

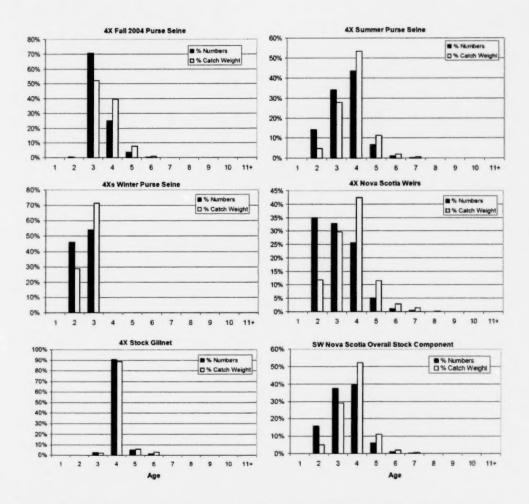


Figure 20. Catch at age for the 2005 SW Nova Scotia / Bay of Fundy spawning component (% numbers and % weight) by gear type.

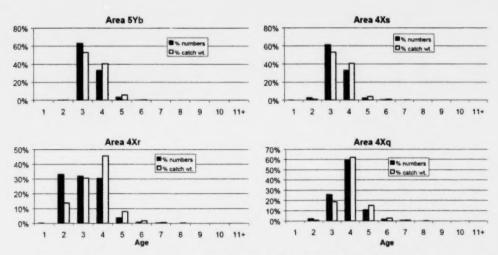


Figure 21. Herring catch at age by NAFO unit area for the 2005 summer purse seine fishery conducted on the SW Nova Scotia / Bay of Fundy spawning component.

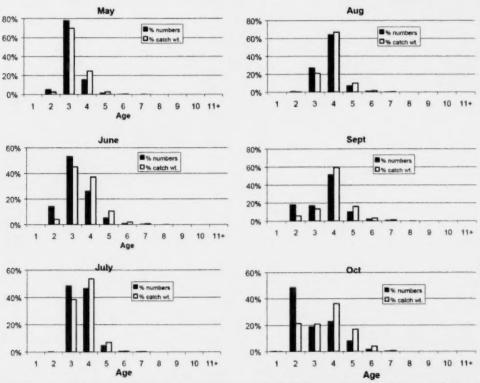


Figure 22. Herring catch at age by month for the 2005 summer purse seine fishery conducted on the SW Nova Scotia / Bay of Fundy spawning component.

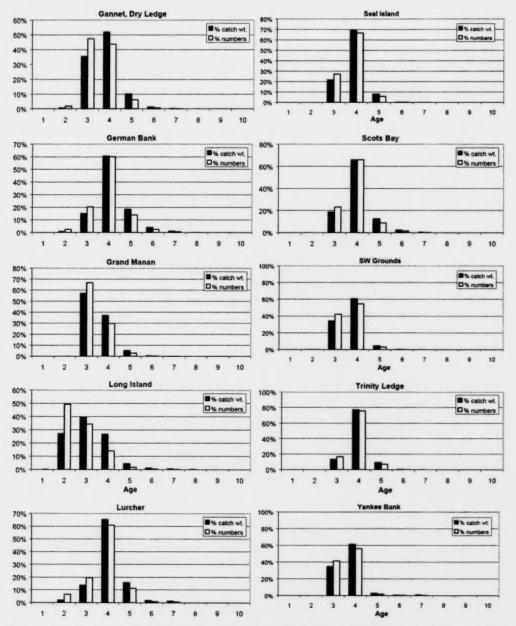


Figure 23. Herring catch at age by fishing ground for the 2005 summer purse seine fishery conducted on the SW Nova Scotia / Bay of Fundy spawning component.

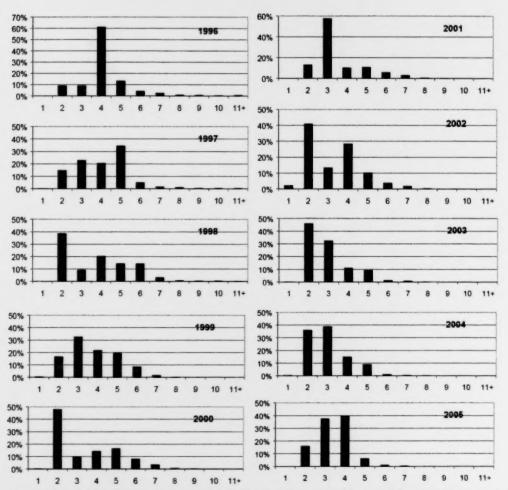


Figure 24. Catch at age (% numbers) for the SW Nova Scotia / Bay of Fundy spawning component (4WX stock) for the most recent 10 years (1996 to 2005).

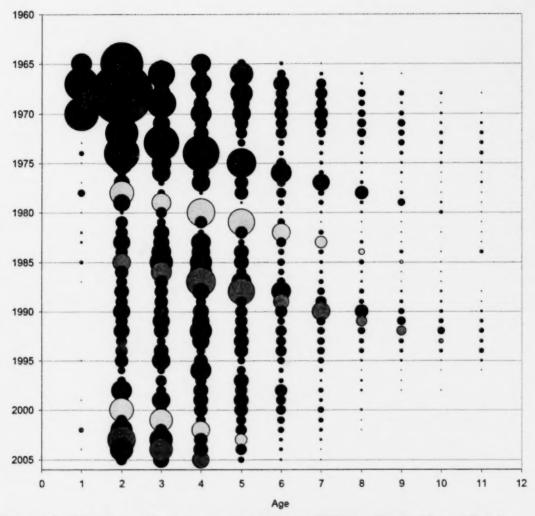


Figure 25. Historical catch at age (numbers) for the SW Nova Scotia / Bay of Fundy spawning component. Refer to Table 18 for actual numbers represented by symbol size. The value for 1968 at age 2 represents the maximum in the series of 2.389 billion. Several of the stronger year-classes are highlighted including the 1970, 1976, 1983, 1998 and 2001 year-classes.

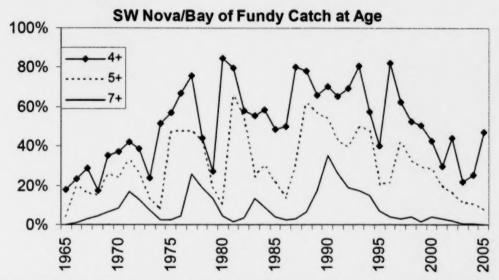


Figure 26. Overall proportions (percent numbers) of ages 4+, 5+ and 7+ in the catch at age for the SW Nova Scotia / Bay of Fundy spawning component for the period 1965 to 2005.

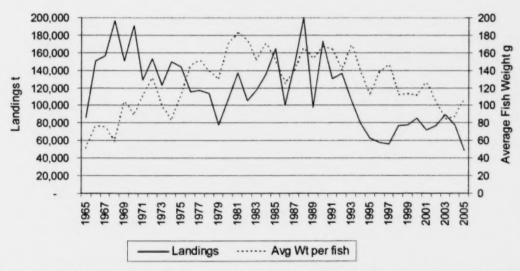


Figure 27. SW Nova Scotia / Bay of Fundy spawning component overall landings (t) and average fish weight in the catch for the period 1965 to 2005.

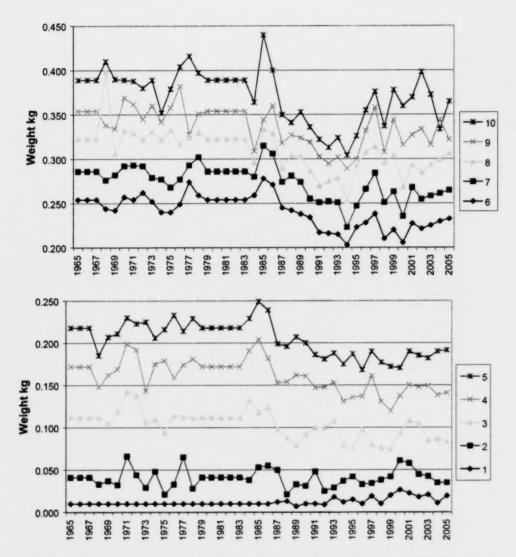


Figure 28. Average weights at age (kg) for the SW Nova Scotia / Bay of Fundy component of the 4WX herring fishery (fishery weighted) for 1965-2005.

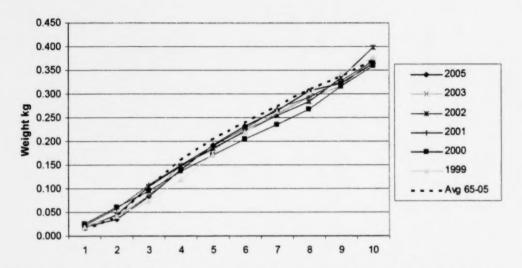


Figure 29. Average weights at age (kg) for the SW Nova Scotia / Bay of Fundy component of the 4WX herring fishery (fishery weighted) for the most recent 5 years individually and the historical series.

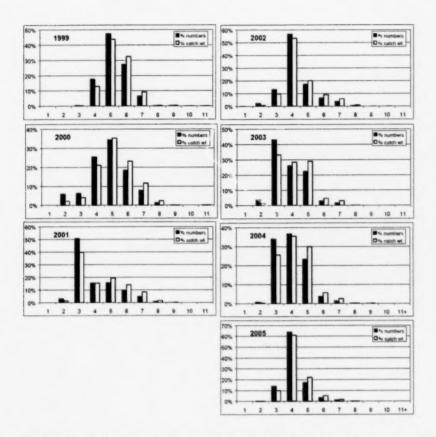


Figure 30. Catch at age by year from the herring acoustic surveys for the overall SW Nova Scotia/Bay of Fundy spawning component.

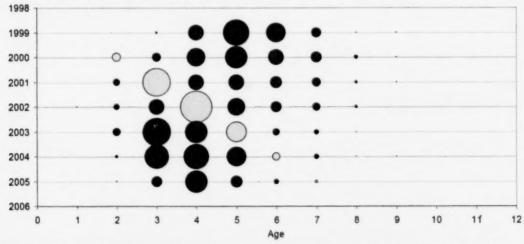


Figure 31. Acoustic survey catch at age (numbers) for the SW Nova Scotia / Bay of Fundy spawning component.

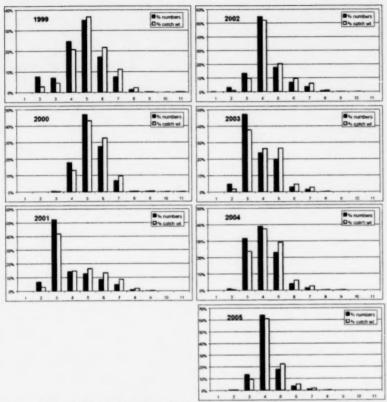


Figure 32. Catch at age by year from the herring acoustic surveys for the German Bank only spawning component.

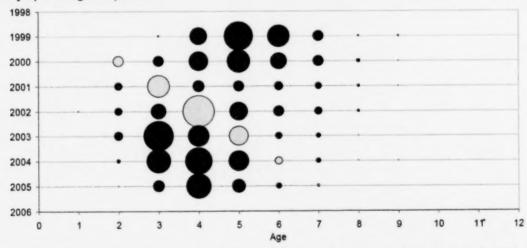


Figure 33. Acoustic survey catch at age (numbers) for the German Bank only spawning component

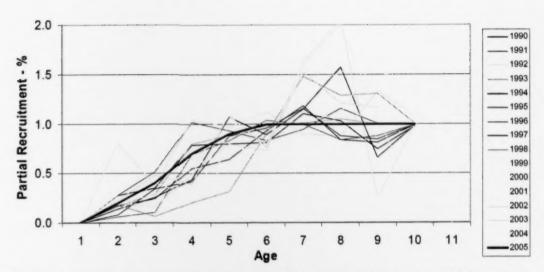


Figure 34. Exploitation pattern at age by year for 1990-2004 from the initial VPA. The 2005 line represents the assumptions made in the terminal year.

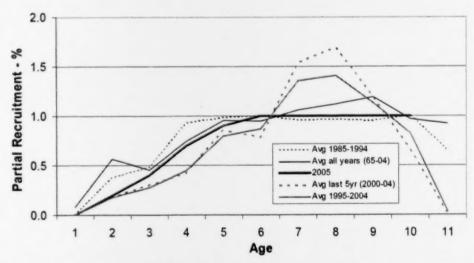


Figure 35. Exploitation pattern at age for various periods from the initial VPA. The 2005 line represents the assumptions made in the terminal year.

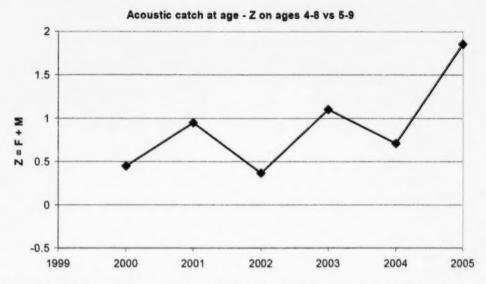


Figure 36. Total mortality estimates (Z=F+M) from acoustic catch at age data for ages 4 to 8 compared with ages 5 to 9 in the following year.

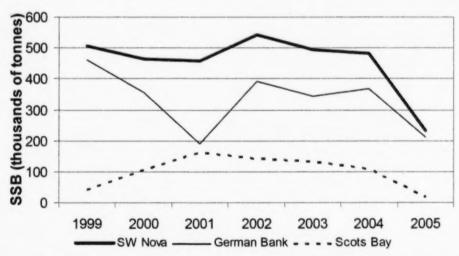


Figure 37. SSB index from acoustic surveys for the SW Nova Scotia / Bay of Fundy spawning component ('SW Nova' values are from the 'Subtotal' row in Table 9).

|   | Parameter | Estimate | Standard Error | Bias   | %SE | % Bias | Avg Squared Residual |
|---|-----------|----------|----------------|--------|-----|--------|----------------------|
| 1 | N[2006 7] | 2457.55  | 2102.42        | 735.34 | 86% | 30%    | 2.54                 |
| 2 | q ID#[1]  | 0.03     | 0.02           | 0.00   | 63% | 18%    | 7.09                 |
| 3 | q ID#[2]  | 0.94     | 0.59           | 0.17   | 62% | 18%    | 2.32                 |
| 4 | q ID#[3]  | 5.38     | 3.33           | 0.99   | 62% | 18%    | 0.41                 |
| 5 | q ID#[4]  | 15.18    | 9.38           | 2.82   | 62% | 19%    | 0.33                 |
| 6 | q ID#[5]  | 16.65    | 10.29          | 3.12   | 62% | 19%    | 0.08                 |
| 7 | q ID#[6]  | 43.63    | 26.94          | 8.20   | 62% | 19%    | 0.46                 |
| 8 | q ID#[7]  | 42.12    | 26.02          | 7.89   | 62% | 19%    | 0.96                 |
| 9 | q ID#[8]  | 18.01    | 11.76          | 3.70   | 65% | 21%    | 5.90                 |

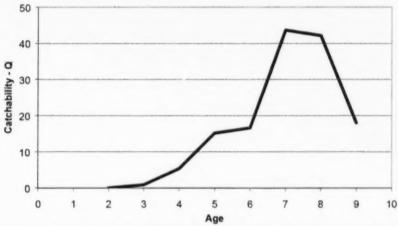


Figure 38. Parameter estimates and plot of catchability by age (Q) from initial VPA run.

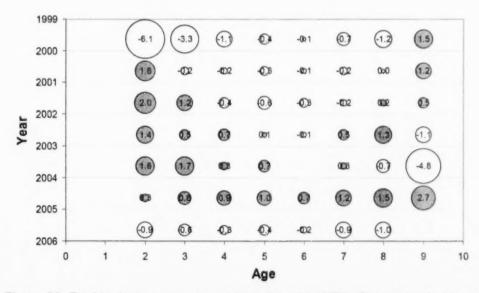


Figure 39. Residuals by age and year from the initial VPA. Circle area is proportional (on a linear scale) to the magnitude of the residual with the predicted values.

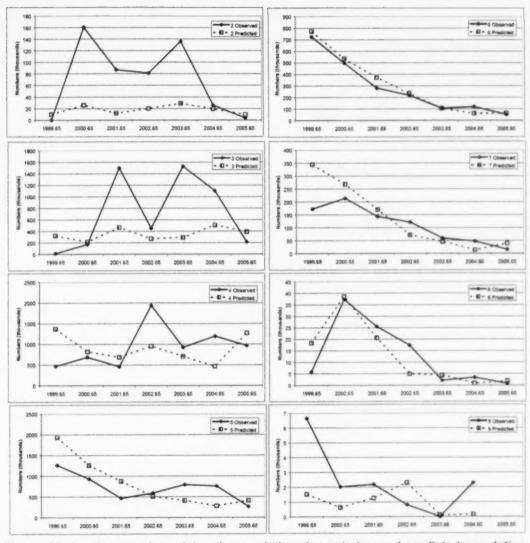


Figure 40. Age by age plots of the observed abundance index and predicted population numbers versus year from an initial VPA using last year's formulation.

| Age | Parameter | Estimate | Standard Error | Bias   | %SE | % Bias | Mean Square Residual |
|-----|-----------|----------|----------------|--------|-----|--------|----------------------|
| 1   | N[2006 7] | 1543.98  | 761.49         | 164.71 | 49% | 11%    | 0.53                 |
| 4   | q ID#[3]  | 5.76     | 1.66           | 0.22   | 29% | 4%     | 0.43                 |
| 5   | q ID#[4]  | 16.25    | 4.69           | 0.64   | 29% | 4%     | 0.33                 |
| 6   | q ID#[5]  | 17.84    | 5.15           | 0.71   | 29% | 4%     | 0.10                 |
| 7   | q ID#[6]  | 46.94    | 13.53          | 1.88   | 29% | 4%     | 0.42                 |
| 8   | q ID#[7]  | 49.09    | 14.16          | 1.96   | 29% | 4%     | 0.92                 |

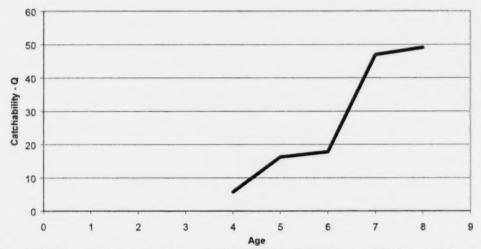


Figure 41. Parameter estimates and plot of catchability by age (Q) from VPA run with overall acoustic index for ages 4 to 8 only.

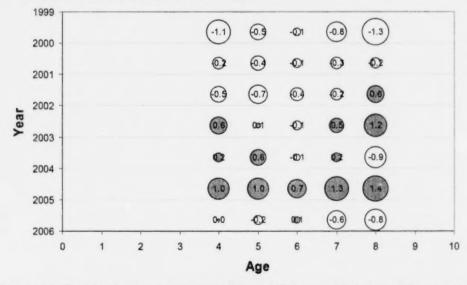


Figure 42. Residuals by age and year from a VPA run with the overall acoustic index for ages 4 to 8 only.

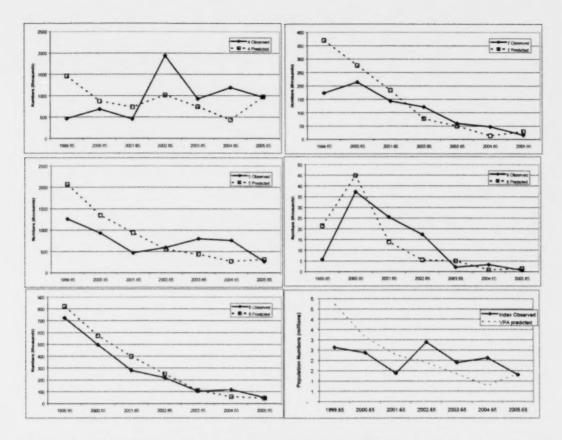


Figure 43. Age by age and overall combined plots of the observed abundance index and predicted population numbers versus year from VPA run with overall acoustic index for ages 4 to 8.

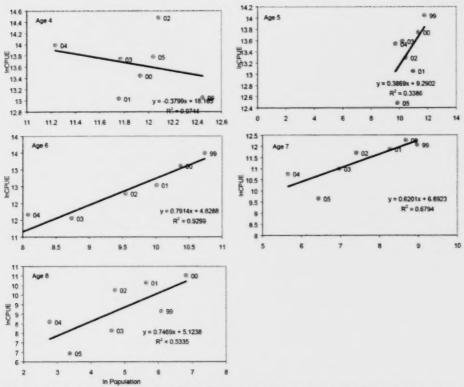


Figure 44. Age by age plots of the (In) observed and (In) predicted abundance index versus population numbers from a tuned VPA with the overall acoustic index for ages 4 to 8 treated as proportional to population numbers.

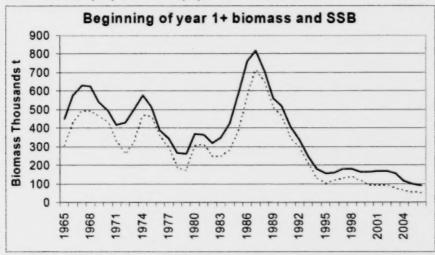


Figure 45. Spawning stock biomass and total biomass for VPA run with overall acoustic index for ages 4 to 8 (overall time series).

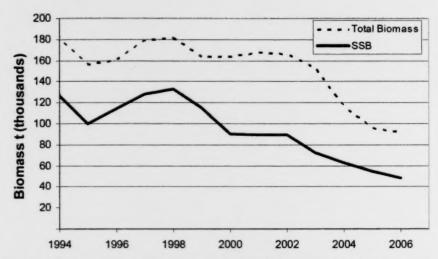


Figure 46. Spawning stock biomass and total biomass for VPA run with overall acoustic index for ages 4 to 8 (time period from 1994 to 2006)



Figure 47. Fishing mortality for VPA run with overall acoustic index for ages 4 to 8

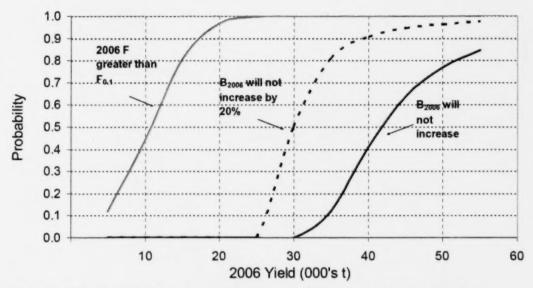


Figure 48. Probability (risk) of the 2006 fishing mortality exceeding F=0.228 and for 2007 total biomass being greater than the 2006 biomass by 0% and 20% at various yield (quota) levels for the VPA model with the overall acoustic index (ages 4 to 8).

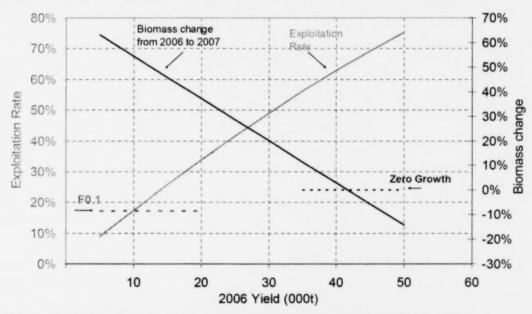


Figure 49. Exploitation rates (%) and total biomass change from 2006 to 2007 for various quotas (yield) in 2006 for the VPA model with the overall acoustic index (ages 4 to 8). The F0.1 reference level (F=0.228 or 17% exploitation) and zero growth levels are also indicated.

| Age | Parameter | Estimate | Standard Error | Bias   | %SE | % Bias | Avg Squared Residual |
|-----|-----------|----------|----------------|--------|-----|--------|----------------------|
|     | N[2006 7] | 2808.85  | 1322.78        | 265.55 | 47% | 9%     | 0.59                 |
| 4   | q ID#[3]  | 3.76     | 1.13           | 0.16   | 30% | 4%     | 0.46                 |
| 5   | q ID#[4]  | 10.39    | 3.12           | 0.44   | 30% | 4%     | 0.46                 |
| 6   | q ID#[5]  | 11.84    | 3.55           | 0.51   | 30% | 4%     | 0.20                 |
| 7   | q ID#[6]  | 30.92    | 9.27           | 1.34   | 30% | 4%     | 0.46                 |
| 8   | q ID#[7]  | 34.55    | 10.37          | 1.50   | 30% | 4%     | 0.87                 |



Figure 50. Parameter estimates and plot of catchability by age (Q) from VPA with German Bank acoustic index (ages 4 to 8).

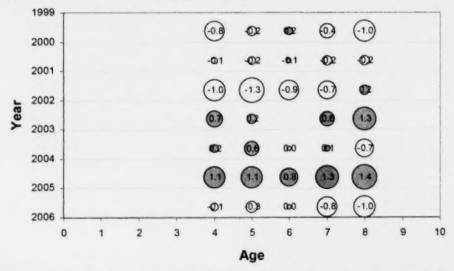


Figure 51. Residuals by age and year from a VPA run with the German Bank acoustic index (ages 4 to 8).

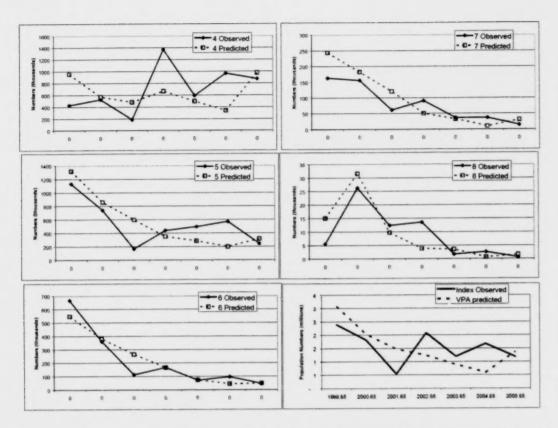


Figure 52. Age by age and overall combined plots of the observed abundance index and predicted population numbers versus year from VPA with German Bank acoustic index (ages 4 to 8).

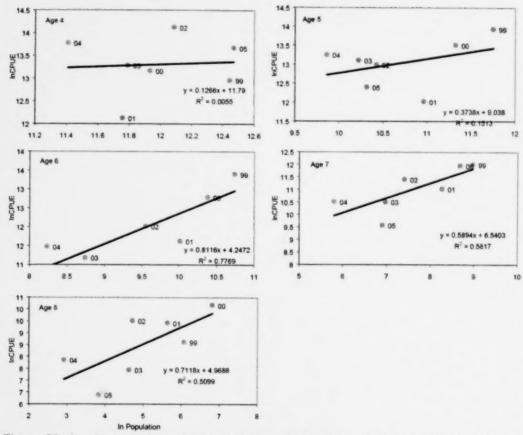


Figure 53. Age by age plots of the (In) observed and (In) predicted abundance index versus population numbers from a tuned VPA with the German Bank acoustic index (ages 4 to 8) treated as proportional to population numbers.

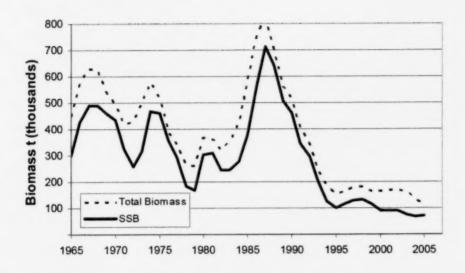


Figure 54. Spawning stock biomass and total biomass for VPA with German Bank acoustic index (ages 4 to 8).

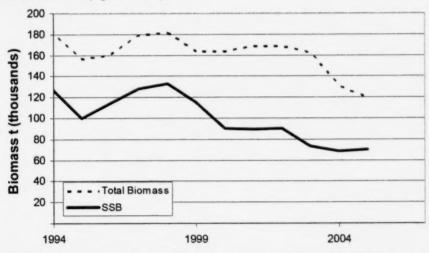


Figure 55. Spawning stock biomass and total biomass for VPA with German Bank acoustic index (ages 4 to 8) (time period from 1994 to 2005).

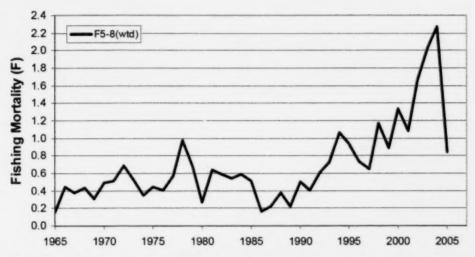


Figure 56. Fishing mortality for VPA with German Bank acoustic index (ages 4 to 8).



Figure 57. Recruitment at age 1 from VPA with German Bank acoustic index (ages 4 to 8).

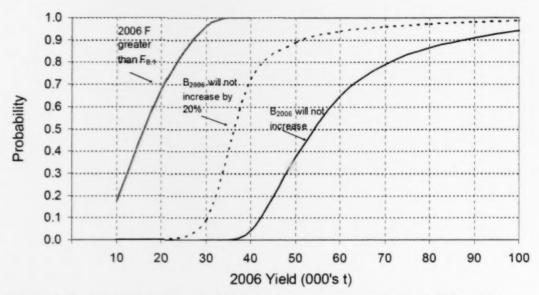


Figure 58. Probability (risk) of the 2006 fishing mortality exceeding F=0.228 and for 2007 total biomass being greater than the 2006 biomass by 0% and 20% at various yield (quota) levels for the VPA model with German Bank acoustic index (ages 4 to 8).

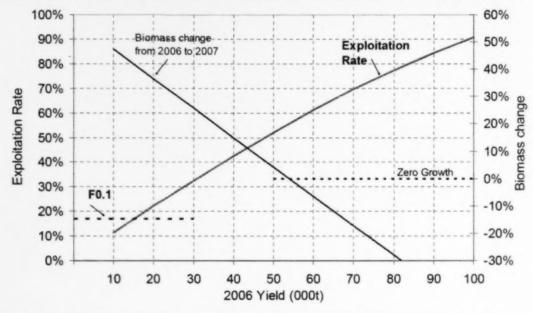


Figure 59. Exploitation rates (%) and total biomass change from 2006 to 2007 for various quotas (yield) in 2006 for the VPA model with German Bank acoustic index (ages 4 to 8). The F0.1 reference level (F=0.228 or 17% exploitation) and zero growth levels are also indicated.

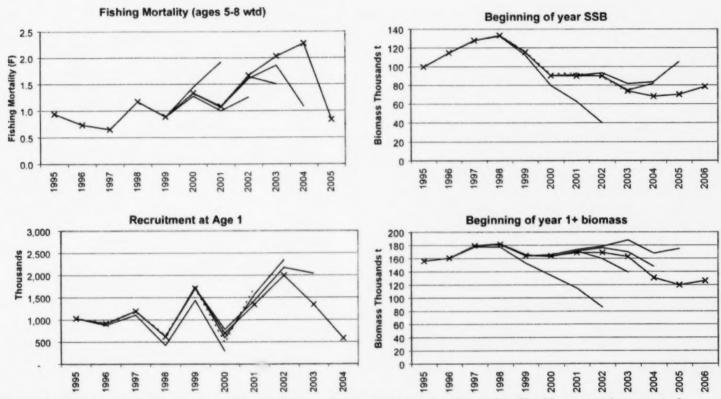


Figure 60. Retrospective analysis for VPA with German Bank acoustic index (ages 4 to 8) with successive years of analysis removed. Results for estimation of fishing mortality (F), recruitment at age 1, beginning of year SSB and beginning of year total biomass.

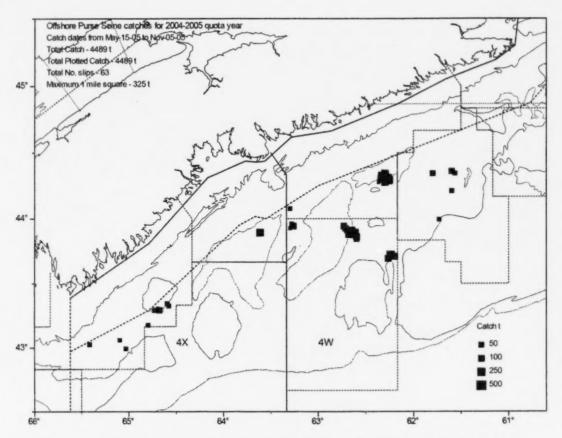


Figure 61. Herring purse seine catches on the offshore Scotian Shelf banks for 2005 with embayment and offshore 25 mile lines shown.

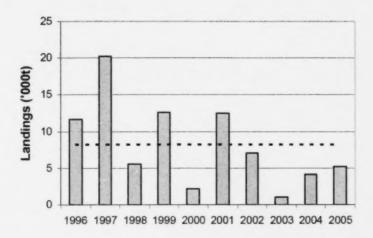


Figure 62. Scotian Shelf Banks landings from purse seine since 1996 with the average for the period.

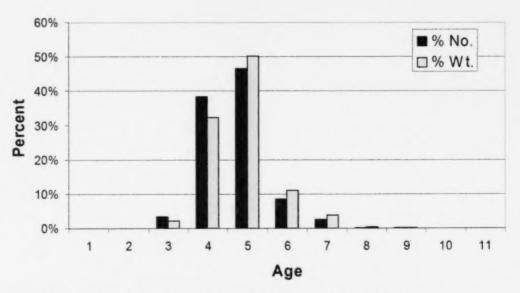


Figure 63. Catch at age for 2005 for the offshore Scotian Shelf banks purse seine fishery (% numbers and % weight).

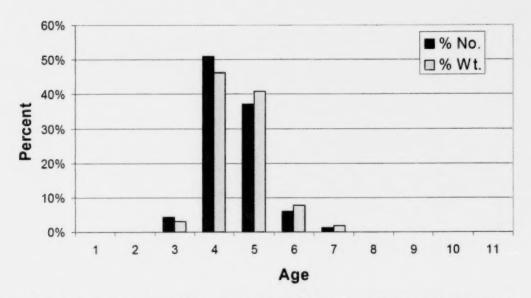


Figure 64. Catch at age for 2005 for the offshore Scotian Shelf banks midwater trawl fishery (% numbers and % weight).

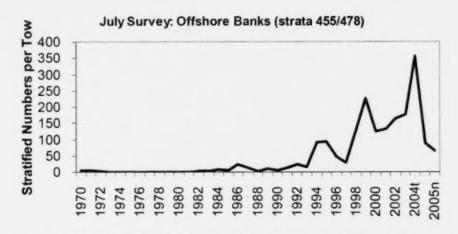


Figure 65. Number of herring caught per standard tow in the DFO summer bottom trawl survey of the offshore Scotian Shelf Banks, 1983 to 2005 (strata 55-78; from Sable Island to Baccaro Line).

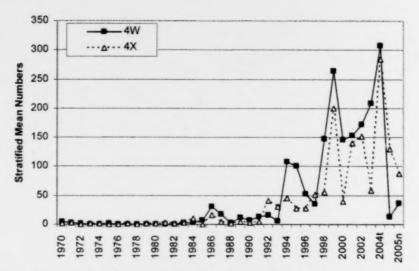


Figure 66. Number of herring caught per standard tow in the DFO summer bottom trawl research survey for 1970 to 2005 for area 4W (strata 53-66) and area 4X (strata 70-95).

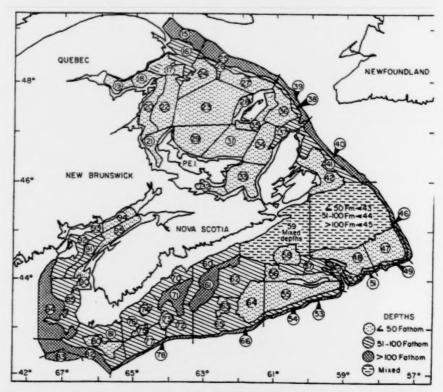


Figure 67. Research bottom trawl survey strata in NAFO Divisions 4T, 4V, 4W and 4X (from Doubleday, 1981).

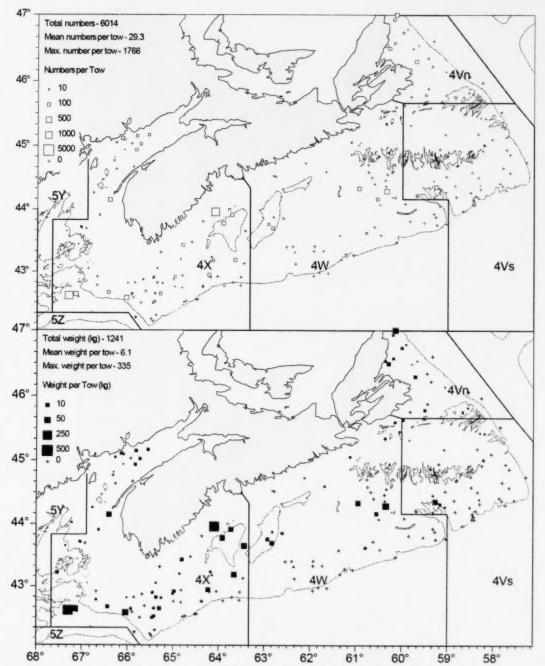


Figure 68. Herring catches in number and weight per tow for the 2005 DFO summer bottom trawl research survey (TEL2005-529/530: July 5-30, 2005).

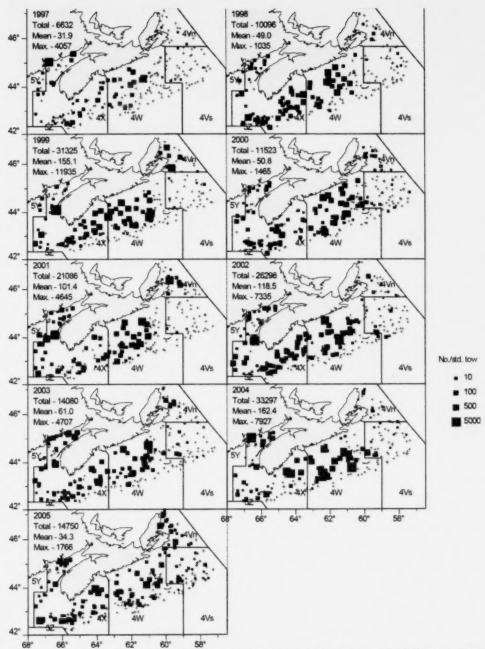


Figure 69. Herring catches (numbers per standard tow) from the DFO summer bottom trawl research survey for 1997-2005.

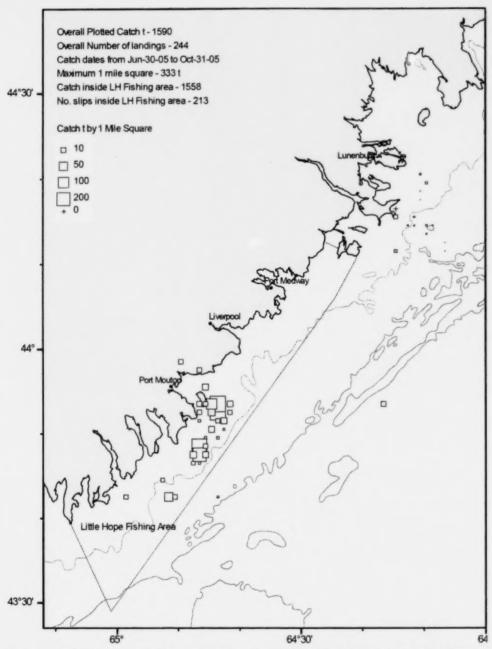


Figure 70. Little Hope/Port Mouton area herring gillnet catches for the 2005 spawning fishery. Overall landings and catches inside the Little Hope Fishing area are determined separately.

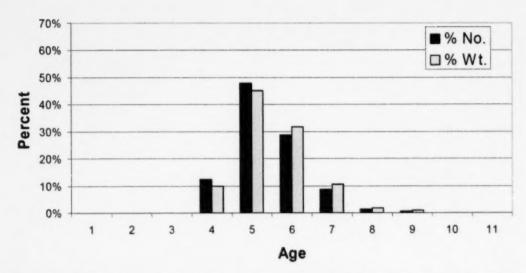


Figure 71. Catch at age (% numbers and % weight) of herring from the Little Hope/Port Mouton gillnet fishery in 2005. Note that the typical mesh size was 2 ½" for this fishery.

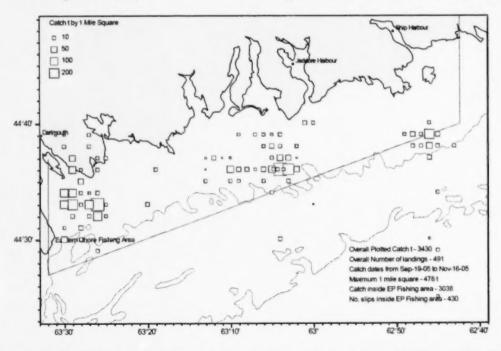


Figure 72. Eastern Shore/Halifax herring gillnet catches for the 2005 spawning fishery. Overall landings and catches inside the defined fishing area are determined separately.

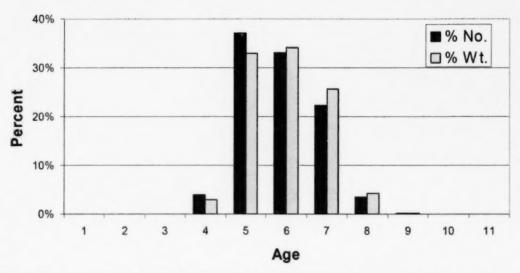


Figure 73. Herring catch at age (% numbers and % weight) for the 2005 Eastern Shore gillnet fishery. Note that the typical mesh size was 2  $\frac{3}{4}$ " for this fishery.

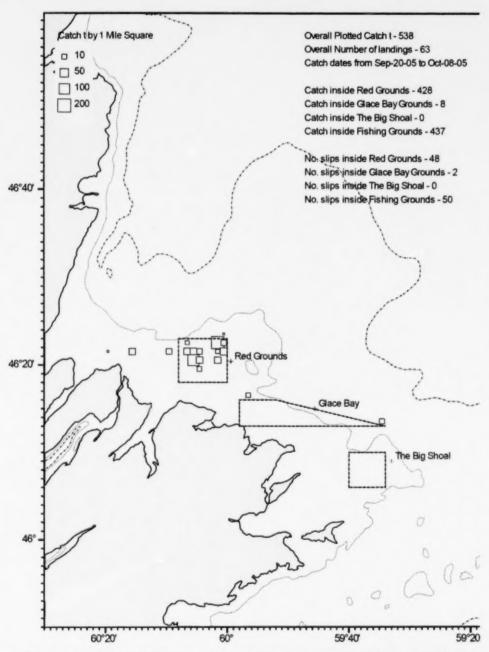


Figure 74. Glace Bay herring gillnet catches (open squares) for the 2005 spawning fishery with catches inside each of the defined fishing areas determined separately.

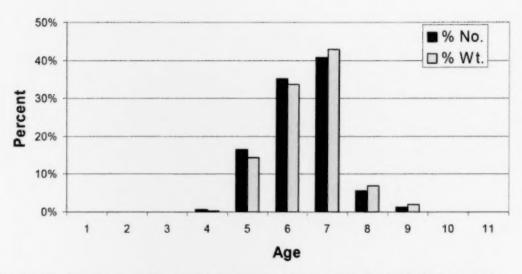


Figure 75. Herring catch at age (% numbers and % weight) for the 2005 Glace Bay gillnet fishery.

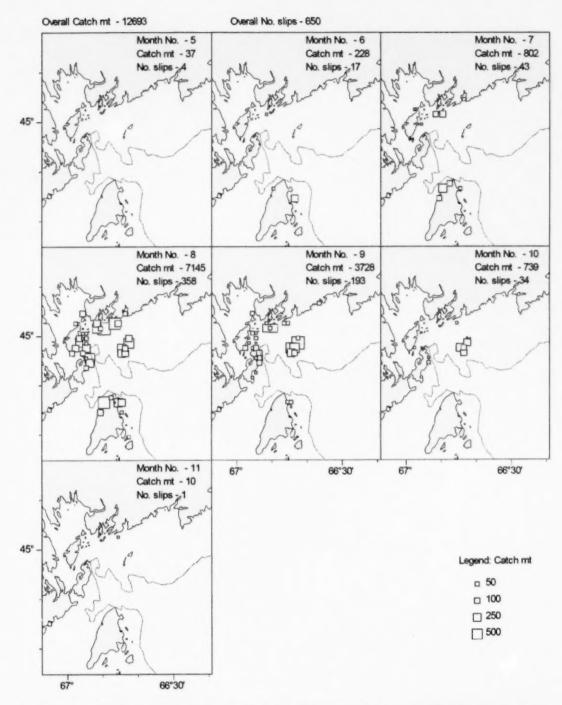


Figure 76. New Brunswick herring weir catches by month for the 2005 fishing season.

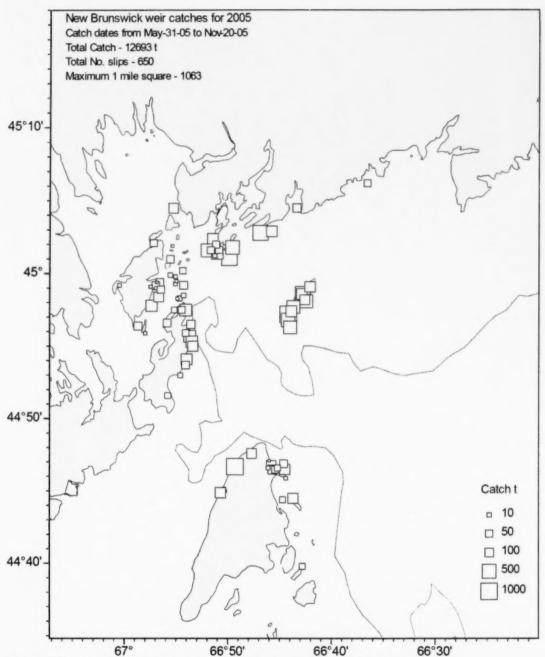


Figure 77. New Brunswick herring weir catches for the 2005 fishing season.

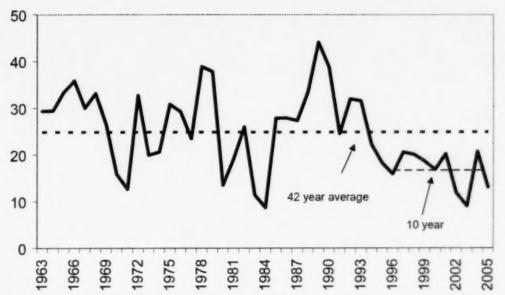


Figure 78. Herring landings from the southwest New Brunswick weir and shutoff fishery, 1963-2005 with overall time period average and recent 10 year average.

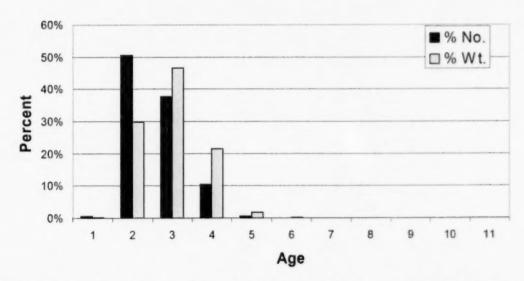


Figure 79. Catch at age (% numbers and % weight) of herring from the 2005 southwest New Brunswick weir and shutoff fisheries.

#### 2005 4WX Herring Fishery: Report of Fleet Activity

Herring Science Council
P.O. Box 517, Yarmouth, NS, B5A 4B4

The herring industry in association with the Herring Science Council provides an annual summary of seiner fleet activity throughout the fishing season. This gives a general overview of the activities of the purse seine fleet and highlights important anecdotal information that may otherwise be lost. Information was gathered through association records, captain's reports and comments, through HSC and DFO staff, and thought DFO landings and samples databases. The following is a summary of the activities for the 2004-2005 quota year purse seine fisheries. Please refer to Tables 1-2, and Figures 1-2 to see a graphic organization of the landings per week and length of fish per week.

#### Offshore/ Scotian Shelf Banks

#### Summary

- · Reactivated fishing area since 1996
- The 2005 Offshore/Scotian Shelf purse seine fishery took place on Weeks 20, 22, 23, 24, 25, 26, and
- A grand total of 4,358 t of herring was caught on the offshore banks, which was similar to 2004 with 4,054 t caught.
- · Weather was described as poor for the majority of the 2005 Offshore/Scotian Shelf fishery.

#### Week 20: May 15- May 21

15 T was landed at Western Hole (1 landing), and 515 T was landed on the Offshore Banks (9 landings). The average fish length on the Offshore Banks was 29.2 cm.

#### Week 22: May 29- June 4

20T (1 landing) of herring was caught at Western Hole.

#### Week 23: June 5- June 11

392T was landed on the Offshore Banks (3 landings) with an average fish length of 28.2 cm, 29T at Shelburne with an average fish length of 26.0, and 153T at Western Hole (5 landings) with an average fish length of 27.2 cm.

#### Week 24: June 12- June 18

760T (7 landings) was landed on the Offshore Banks with fish averaging a length of 29.0cm.

#### Week 25: June 19- June 25

812T (11 landings) was landed on the Offshore Banks this week, with average length of herring being 28.7 cm.

#### Week 26: June 26 - July 2

Much of the seining fleet was fishing off Halifax this week. 1581T (16 landings) of herring was landed from the Offshore Banks with fish averaging 29.2 cm in length.

#### Week 29: July 17- July 23

26 T (1 landing) was landed from Western Hole.

#### South West Nova Scotia Component

The quota year for South West Nova is from the period October 15 to the following October 14, and so catches from October 15 to December 31, 2004 are included in the quota total. The 2005-year fishing weeks are summarized separately below.

#### Summary

- The purse seine fleet concentrated their efforts on pre-spawning aggregations mainly on the Long Island Shore, the Grand Manan Banks, Gannett Dry Ledge, and Lurcher.
- Spawning aggregations were targeted on German Bank and Scots Bay.
- Weeks 1-3 showed activity in NB Coastal and the Grand Manan Banks.
- Fishing started at about the same time as last year in the spring at week 19: May 9-May 15, compared to 2003 when they started in Week 18: April 27- May 3, and 2002 when the fishery started at Week 16: April 13-19.
- . The weather varied across the season with good weather and poor weather throughout.
- In May about 68% of landings came from the Gannet Dry Ledge, June the majority of landings were
  from Long Island Shore at 83%, July the greatest was 33% from the Grand Manan Banks. In August
  51% of the landings came from Scots Bay. September the majority was from German Bank at 59%
  with landings from Scots Bay at 3%. The month of October had 60% of landings were from the
  German Bank.

#### 2004 Fishing Weeks

#### Week 42: October 17- October 23

One landing was made on Gannett Dry Ledge of 22 T. 132 T was caught on the Grand Manan Banks from 6 landings. 78T (2 landings) was landed on the Long Island Shore, and 515 T (24 landings) in NB Coastal.

#### Week 43: October 24- October 30

27 T was landed from the Grand Manan Banks in 2 landings. 562T was landed from NB Coastal in 20 landings.

#### Week 44: October 31- November 6

45 T (1 landing) of herring was caught on the Grand Manan Banks, and 361T (9 landings) was landed from NB Coastal this week.

#### Week 45: November 7- November 13

3 landings were made from NB Coastal (116 T) and 6 landings were made from the Grand Manan Banks (175T) this week.

#### 2005 Fishing Weeks

#### Week 1: January 2- January 8

Landings were made this week on the Grand Manan Banks and NB Coastal. 15 T (1 landing) was landed on the Grand Manan Banks, and 161 T (6 landings) was landed in NB Coastal. The average fish length in NB Coastal was 16.9cm.

#### Week 2: January 9- January 15

This week 7 landings were made in NB Coastal totalling in 175Tm with herring length averaging 15.0cm.

#### Week 3: January 16- January 22

5 landings were made this week in NB Coastal totaling in 220T of herring landed.

#### Week 19: May 8- May 14

2 landings were made in Trinity (23T) and 1 in Lurcher (17T) this week.

#### Week 20: May 15- May 21

262 T was landed from Gannet Dry Ledge (10 landings) with an average fish length of 22.1cm, 39T was caught on German Bank (4 landings), 30 T was landed on Lurcher Shoal (3 landings) with an average fish length of 22.5cm, and 13 T was caught in Trinity (1 landing).

Week 22: May 29- June 4

62 T was caught from 3 landings at Gannet Dry Ledge having the average fish length at 26.6cm, 12 T (1 landing) from the Grand Manan Banks with an average fish length of 22.5cm, 1,189 T (29 landings) from the Long Island Shore with fish length averaging 21.9cm, and 37 T (1 landing) from Lurcher Shoal with fish lengths at an average of 26.5cm.

Week 23: June 5- June 11

628 T from 17 landings were made at Long Island Shore, 15T from 1 landing was seined on Gannet Dry Ledge. The average fish length at the Long Island Shore was 22.9cm.

Week 24: June 12- June 18

437 T (10 landings) was landed from the Grand Manan Banks, 91 T (2 landings) from the Long Island Shore and 16 T (1 landing) from German bank this week. The average fish length on the Grand Manan Banks was 26.0cm, and the average fish length on the Long Island Shore was 24.5cm.

Week 25: June 19- June 25

89T was caught on the Grand Manan Banks from 3 landings, and 686 T was landed from the Long Island Shore from 21 landings this week. The average fish length on the Grand Manan Banks was 26.5cm, and on the Long Island Shore was 23.5cm.

Week 26: June 26- July 2

The fleet was split this week with about half of the seiners fishing in SWN. 621T was procured from the Longs Island Shore this week from 15 landings. Average fish length on the Long Island Shore was 25.2 cm.

Week 27: July 3- July 9

This week the fleet had returned to fishing the area off SW Nova Scotia. 432 T (7 landings) was caught on Gannet Dry Ledge average fish length 25.3cm, 946 T (25 landings) of herring was obtained from the Grand Manan Banks this week average fish length of 24.3cm, 1,268 T (18 landings) were caught on German Bank average fish length 25.7 cm, 293 T (10 landings) caught on the Long Island Shore average fish length 24.2cm, 963 T (14 landings) from the SW Grounds average fish length 25.7cm, and 69 T from 1 landing on Seal Island with an average fish length of 26.2cm.

Week 28: July 10- July 16

877 T (16 landings) landed on Gannet Dry Ledge average fish length of 26.3cm, 184 T (4 landings) landed on German Bank average fish length 26.6cm, 1,761 T (37 landings) landed on the Grand Manan Banks average fish length 24.3cm, 76T (1 landing) landed on the SW grounds, and 1,170T (20 Landings) landed on Seal Island average fish length 26.2cm.

Week 29: July 17- July 23

235 T (4 landings) from Gannet Dry Ledge average fish length 24.6cm, 1,303 T (22 landings) from German Bank average fish length 26.2cm, 1,548 T (37 landings) from the Grand Manan Banks average fish length 23.6cm, 103 T (1 landing) from the Long Island Shore average fish length 25.5cm, 71 T (3 landings) from Seal Island were made this week.

Week 30: July 24- July 30

Five seiners fished Scots Bay this week and landed roe fish for four nights. 1,041 T of herring was landed from 18 landings made in Scots Bay. The average length of the herring caught in Scots Bay was 26.5cm. 202 T (5 landings) was caught on Gannet Dry Ledge average fish length 26.7cm, 208 T (5 landings) was landed from German Bank average fish length 27.0cm, 116T (6 landings) was caught on the Grand Manan Banks average fish length 24.4cm, 16T (1 landing) caught on the Long Island Shore average fish length 25.5cm, and 311 T (6 landings) landed from Trinity with an average fish length of 26.4cm.

Week 31: July 31- August 6

The first survey of Scots Bay was completed on Sunday July 31, 2005. It involved 4 seiners. No fish were landed the night of the survey. Fish were landed the following evening. The vessels reported that fish were not showing up as well as they had mid-week the week before. 80 T of herring was landed from 1 landing made in Scots Bay this week with fish averaging 25.9cm in length. 93 T (1 landing) of fish was caught on German Bank, 69 T (4 landings) on the Grand Manan Banks average length 25.2cm, 9 T (1

landing) on Long Island Shore average length 26.3cm, 761 T (18 landings) on Lurcher Shoal average length 26.3cm, and 946T (16 landings) on Trinity Ledge with an average length of 26.6cm.

Week 32: August 7- August 13

A good showing of fish in Scots Bay was noted on August 7 and 8. 648 T of herring was landed in Scots Bay this week from 15 landings. The average length of the fish caught in Scots Bay was 26.1cm. 334 T was landed on Gannet Dry ledge from 10 landings average fish length of 23.2cm and 17 T of herring was caught from one landing was caught on German Bank.

Week 33: August 14- August 20

Roe fish was first landed on German Bank the night of August 18<sup>th</sup>. 105 T of herring was caught on German Bank from 4 landings this week. 810 T of herring was caught in Scots Bay from 16 landings this week. The average length of herring caught in Scots Bay was 25.9cm. 482 T of herring was caught on Yankee Bank from 6 landings this week with an average fish length of 25.8cm.

Week 34: August 21- August 27

The second structured survey of Scot's Bay was completed on Sunday August 21, 2005. It involved the cooperation of 12 seiners. 2,771 T of herring was caught from 37 landings in Scots Bay this week. The average fish length of herring caught in Scots Bay this week was 26.8cm. Roe fish was landed again on German Bank the night of August 23<sup>rd</sup>. It was discussed that the first wave of roe fish was missed and not documented in a structured survey. 329 T of herring was caught on German Bank from 5 landings this week. 54 T (1 landing) was landed on Gannet Dry Ledge, 23 T (1 landing) from the Grand Manan Banks, 143 (8 landings) from the Long Island Shore average fish length of 21.9cm, 79 T (1 landing) from NB Coastal, 43 T (1 landing) from Yankee Bank.

Week 35: August 28- September 3

Some fish was seen throughout the week in Scots Bay. However a problem was a lack of seiner presence in the area. However, 571 T of herring was caught in Scots Bay this week from 11 landings. The average fish length of herring caught in Scots Bay this week was 26.2cm. 20 landings were made in German Bank this week, resulting in 1,015T of herring caught. Herring caught on German Banks averaged 27.1cm in length. 34 T (1 landing) were caught on Gannet Dry Ledge, 25 T (1 landing) on the Grand Manan Banks average fish length 24.8cm, 95 T (6 landings) on the Long Island Shore average fish length 24.2cm, and 21 T (1 landing) on Lurcher Shoal.

Week 36: September 4- September 10

Fish were noted in Scots Bay, but there were only two seiners fishing at the time, so conducting a survey was not possible at that time. 318T of herring was caught in Scots bay this week from 6 landings. 26.3cm was the average fish length of fish caught in Scots Bay this week. Boats were fishing roe fish on German Bank this week. It was reported that there were good amounts, but the fish were not in the best condition. The first structured survey of German Bank was conducted on September 7<sup>th</sup>, and was completed with the aid and direction of 11 seiners. 2,744 T of herring was taken from German Bank this week in 42 landings. The average fish length on German Bank was 27.1cm this week. Roe fish was taken from Trinity Ledge for several nights by 4-6 gill-netters during the week. 178 T (4 landings) was caught on the Long Island Shore average fish length 21.4cm, 189 T (4 landings) on the SW Grounds average fish length of 23.9cm, and 48 T (2 landings) at Seal Island.

Week 37: September 11- September 17

The third structured survey of Scots Bay was completed on Sunday September 11<sup>th</sup>, 2005. 5 seiners and one carrier participated. A large amount of roe fish was noted on the spawn toe part of German Bank. 1,521 T of herring was caught on German Bank this week from 32 landings. The average fish length on German Bank this week was 27.0cm. 29 T (1 landing) was caught on the Grand Manan Banks, 420 T (18 landings) on the Long Island Shore average fish length 22.7cm, 170 T (2 landing) on Lurcher average fish length 21.6cm, and 21 T (1 landing) on Trinity. Later in the week a good amount of wind was noted.

Week 38: September 18- September 24

The high winds did not chase the roe fish off German Bank. However, the winds did postpone survey activities early in the week. The second structured survey of German Bank was completed on September 21, 2005. 1,645 T of herring was caught on German Bank this week from 21 landings. The average length of herring caught on German Bank this week was 27.3cm. 281 T (5 landings) was caught on

Gannet Dry Ledge average fish length of 27.1cm, 284 T (9 landings) was caught on the Long Island Shore average fish length of 22.7cm, 647 T (11 landings) was caught on Lurcher average fish length of 27.3cm, and 134 T (2 landings) was caught at Trinity.

Week 39: September 25- October 1

95 T ( 2 landings) was caught from German Bank average fish length of 27.4cm, 149T (4 landings) from the Grand Manan Banks average fish length of 26.1cm, and 1,391 T (38 landings) from the Long Island Shore with an average fish length of 19.6cm.

Week 40: October 2- October 8

The 3<sup>rd</sup> structured survey of German Bank was initiated on the evening of October 4<sup>th</sup>, 2005. Eight seiners participated in this survey. A good amount of roe fish were noted south of German Bank. The boats were able to get the fish they needed each night on German Bank. 2,427 T of herring was landed from German Bank this week from 32 landings. The average length of herring taken from German Bank this week was 27.4cm. 178 T (4 landings) was landed on Gannet Dry Ledge average fish length of 26.9cm, 400 T (13 landings) from the Grand Manan Banks average fish length of 26.0cm, 999 T (32 landings) from the Long Island Shore average fish length of 18.7cm, 9 T (1 landing) from Lurcher, and 3 T (1 landing) from Yankee Bank.

#### Week 41: October 9- October 14

Roe fish came off German Bank early this week. The weather was quite windy this week, and the bait market was being filled for most of the week. This made it difficult to get seiners out to check on German Bank in hopes of completing another survey. 1,162 T of herring was caught on German Bank this week from 12 landings. The average length of herring caught on German Bank this week was 25.5cm. The last survey of German Bank was completed on October 18<sup>th</sup>, 2005 by four seiners in a non-structured fashion. 151 T (5 landings) was landed from Gannet Dry Ledge average fish length of 27.0cm, 13 T (1 Landing) from the Grand Manan Banks, 578 T (11 landings) from the Long Island Shore average fish length 18.9cm, and 104 T (2 landings) from NB Coastal.

#### Acknowledgements:

A sincere thank you is extended to all captains who provided me with information throughout the fishing season. Thanks to Donna Larkin of South West Seiners Co. Ltd., Joy Fry of the Atlantic Herring Co-op, Michael Power from SABS, and Jay Lugar from the HSC for all of their help in producing this document.

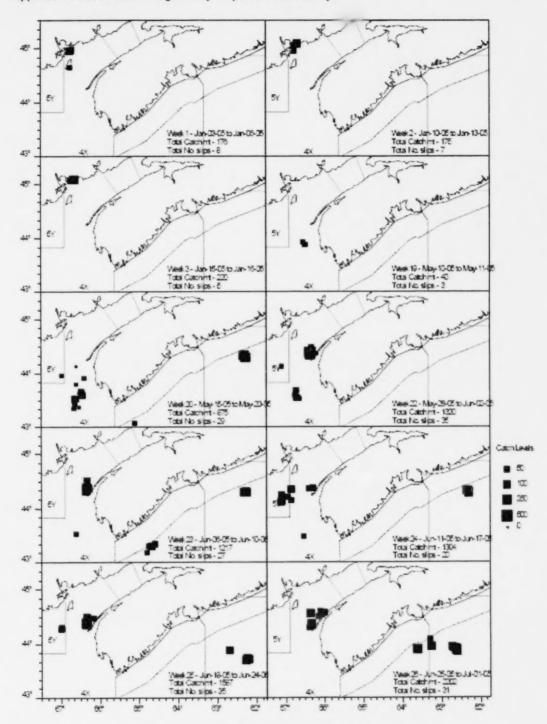


Figure A1: 4WX Purse Seine Catches by Week

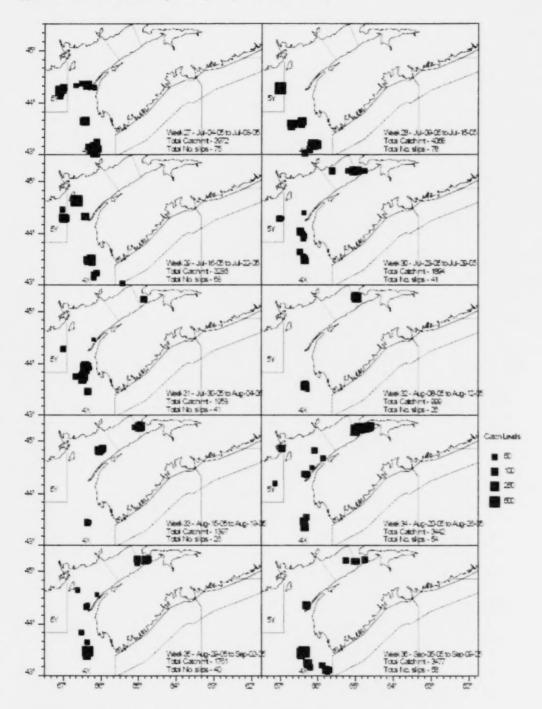


Figure A1 (cont.). 4WX Purse Seine Catches by Week

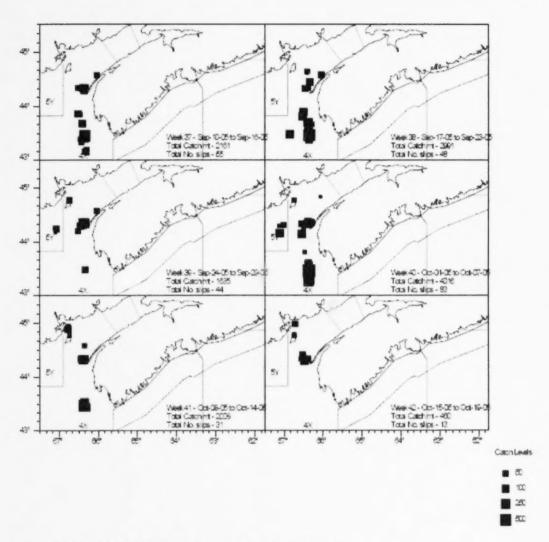


Figure A1 (cont.). 4WX Purse Seine Catches by Week

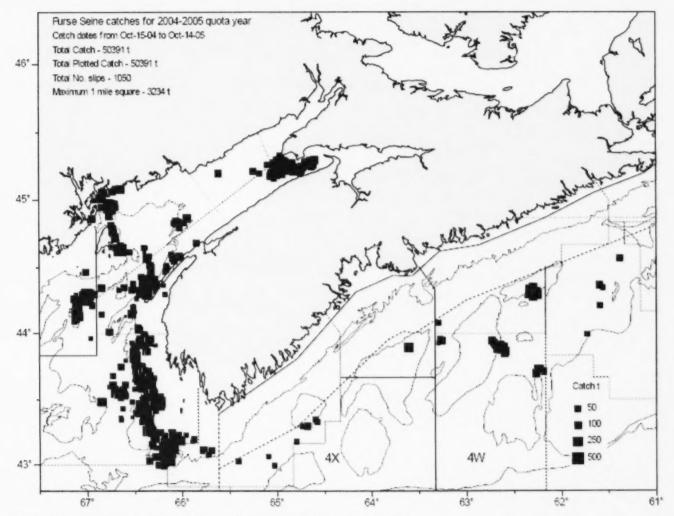


Figure A2: 4WX Purse Seine Catches for the 2004-2005 Quota Year

Table A1: 4WX Landings by Week and by Area

| Sum of<br>CATCH |           |                   |      |     |       |       |       |       |       |       |       |       |       |       |       |         |       |       |       |       |       |       |       |       |       |       |       |     |        |                            |
|-----------------|-----------|-------------------|------|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-----|--------|----------------------------|
| MT              |           |                   | Week |     |       |       |       |       |       |       |       |       |       |       |       |         |       |       |       |       |       |       |       |       |       |       |       |     |        |                            |
| YEAR            |           | Fishing Grounds   | 1    | 2   | 3 19  | 9 20  | 22    | 23    | 24    | 25    | 26    | 27    | 28    | 29    | 30    | 31      | 32    | 33    | 34    | 35    | 36    | 37    | 38    | 39    | 40    | 41    |       | 43  | 44 4   | 5 Grand Tota               |
| 2004            |           | Gannet, Dry Ledge |      |     |       |       |       |       |       |       |       |       |       |       |       |         |       |       |       |       |       |       |       |       |       |       | 21    |     |        | 2                          |
|                 |           | Grand Manan       |      |     |       |       |       |       |       |       |       |       |       |       |       |         |       |       |       |       |       |       |       |       |       |       | 132   | 27  | 45 17  |                            |
|                 |           | Long Island       | 1    |     |       |       |       |       |       |       |       |       |       |       |       |         |       |       |       |       |       |       |       |       |       |       | 78    |     |        | 7                          |
|                 |           | N.B. Coastal      |      |     |       |       |       |       |       |       |       |       |       |       |       |         |       |       |       |       |       |       |       |       |       |       |       |     | 361 11 |                            |
|                 | 405 Total |                   |      |     |       |       |       |       |       |       |       |       |       |       |       |         |       |       |       |       |       |       |       |       |       |       |       |     | 406 29 |                            |
| 2004 Total      |           |                   |      |     |       |       |       |       |       |       |       |       |       |       |       |         |       |       |       |       |       |       |       |       | 420   | 454   | /44   | 589 | 406 29 |                            |
| 2005            | 405       | Gannet, Dry Ledge |      |     |       | 262   |       | 15    |       |       |       | 432   |       | 235   | 202   |         | 34    |       | 54    | 34    |       |       | 281   |       | 178   | 151   |       |     |        | 3,11                       |
|                 |           | German Bank       |      |     |       | 39    |       |       | 16    |       |       | 1,268 |       |       | 208   |         | 17    | 105   | 329   |       | 2,744 |       | 1,645 | 95    |       |       |       |     |        | 14,17                      |
|                 |           | Grand Manan       | 15   |     |       |       | 12    |       | 437   | 89    |       |       | 1,761 |       | 116   | 69      |       |       | 23    | 25    |       | 29    |       | 149   |       | 13    |       |     |        | 5,63                       |
|                 |           | Long Island       | 1    |     |       |       | 1,189 |       | 91    | 686   | 621   | 293   |       | 103   | 16    | 9       |       |       | 143   | 95    | 178   | 420   |       | 1,391 |       | 578   |       |     |        | 7,72                       |
|                 |           | Lurcher           |      |     | 17    | 7 30  | 37    | ,     |       |       |       |       |       |       |       | 761     |       |       |       | 21    |       | 170   | 647   |       | 9     |       |       |     |        | 1,69<br>73<br>1,22<br>6,23 |
|                 |           | N.B. Coastal      | 161  | 175 | 220   |       |       |       |       |       |       |       |       |       |       |         |       |       | 79    |       |       |       |       |       |       | 104   |       |     |        | 73                         |
|                 |           | S.W. Grounds      |      |     |       |       |       |       |       |       |       | 963   | 76    |       |       |         |       |       |       |       | 189   |       |       |       |       |       |       |     |        | 1,22                       |
|                 |           | Scots Bay         | 1    |     |       |       |       |       |       |       |       |       |       |       | 1.041 | 80 6    | 48    | 810 2 | 2,771 | 571   | 318   |       |       |       |       |       |       |     |        | 6.23                       |
|                 |           | Seal Island       |      |     |       |       |       |       |       |       |       | 69    | 1,170 | 71    |       |         |       |       |       |       | 48    |       |       |       |       |       |       |     |        | 1,35                       |
|                 |           | Trinity           | 1    |     | 2:    | 3 13  | 3     |       |       |       |       |       |       |       | 311   | 946     |       |       |       |       |       | 21    | 134   |       |       |       |       |     |        | 1,44                       |
|                 |           | Unspecified       | 1    |     |       |       |       |       |       |       |       |       | 86    | 32    |       | 10      |       | 15    |       | 38    |       |       |       |       |       |       |       |     |        | 18                         |
|                 |           | Yankee Bank       |      |     |       |       |       |       |       |       |       |       |       |       |       |         |       | 482   | 43    |       |       |       |       |       | 3     |       |       |     |        | 44,05<br>10                |
|                 | 405 Total |                   | 176  | 175 | 220 4 | 0 345 | 1,300 | 643   | 544   | 775   | 621   | 3.972 | 4,154 | 3,292 | 1.894 | 1,968 9 | 99 1  | 412 3 | 3,442 | 1,799 | 3,477 | 2,161 | 2,991 | 1,635 | 4,016 | 2.008 |       |     |        | 44,05                      |
|                 | 506       | Grand Manan       |      |     |       |       |       |       |       |       |       |       |       |       |       |         |       |       |       |       |       |       |       |       |       |       | 106   |     |        | 10                         |
|                 |           | Long Island       |      |     |       |       |       |       |       |       |       |       |       |       |       |         |       |       |       |       |       |       |       |       |       |       | 312   |     |        | 31                         |
|                 |           | N.B. Coastal      |      |     |       |       |       |       |       |       |       |       |       |       |       |         |       |       |       |       |       |       |       |       |       |       | 48    |     |        | 4                          |
|                 | 506 Tota  |                   |      |     |       |       |       |       |       |       |       |       |       |       |       |         |       |       |       |       |       |       |       |       |       |       | 468   |     |        | 46                         |
|                 |           | Offshore Banks    |      |     |       | 515   | 5     | 392   | 760   | 812   | 1.581 |       |       |       |       |         |       |       |       |       |       |       |       |       |       |       |       |     |        | 46                         |
|                 |           | Shelburne         |      |     |       |       |       | 29    |       |       |       |       |       |       |       |         |       |       |       |       |       |       |       |       |       |       |       |     |        | 21                         |
|                 |           | Western Hole      |      |     |       | 15    | 20    | 153   |       |       |       |       |       | 26    |       |         |       |       |       |       |       |       |       |       |       |       |       |     |        | 21                         |
|                 | 2005 Tot  |                   |      |     |       | 530   | ) 20  | 574   | 760   | 812   | 1,581 |       |       | 26    |       |         |       |       |       |       |       |       |       |       |       |       |       |     | 8      | 5 4,35                     |
| 2005 Total      |           |                   | 176  | 175 | 220 4 | 0 875 | 1.320 | 1,217 | 1,304 | 1.587 | 2.202 | 3,972 | 4,154 | 3,318 | 1.894 | 1,968 9 | 99 1. | 412 3 | 3,442 | 1,799 | 3,477 | 2.161 | 2,991 | 1,635 | 4,016 | 2,008 | 468   |     |        | 5 48,88                    |
| 2006            | 506       | Grand Manan       | 29   |     |       |       |       |       | -10-  |       |       |       |       |       |       |         |       |       |       |       |       |       |       |       |       |       |       |     |        | 2                          |
| 2000            | 200       | N.B. Coastal      | 417  |     |       |       |       |       |       |       |       |       |       |       |       |         |       |       |       |       |       |       |       |       |       |       |       |     |        | 41                         |
|                 |           | Unspecified       | 1    | 16  |       |       |       |       |       |       |       |       |       |       |       |         |       |       |       |       |       |       |       |       |       |       |       |     |        | 1                          |
|                 | 506 Tota  |                   | 446  | 16  |       |       |       |       |       |       |       |       |       |       |       |         |       |       |       |       |       |       |       |       |       |       |       |     |        | 46                         |
| 2006 Total      |           |                   | 446  | 16  |       |       |       |       |       |       |       |       |       |       |       |         |       |       |       |       |       |       |       |       |       |       |       |     |        | 46                         |
| Grand Total     |           |                   | 622  | 101 | 220 4 | 0 875 | 1 320 | 1 217 | 1 304 | 1 587 | 2 202 | 3 972 | 4 154 | 3 318 | 1 894 | 1,968 9 | 99 1  | 412   | 3 442 | 1 799 | 3.477 | 2 161 | 2 991 | 1.635 | 4 016 | 2 008 | 1.212 | 589 | 406 34 | 6 51,37                    |

Table A2: 4WX Average Herring Length by Week and Area

|          |                   |                     | WEEK |        |      |       |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |                   |
|----------|-------------------|---------------------|------|--------|------|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------------------|
| AREA     | NAME              | Data                |      | 1      | 2 2  | 0 22  | 23  | 24  | 25  | 26  | 27  | 28  | 29  | 30  | 31  | 32  | 33  | 34  | 35  | 36  | 37  | 38  | 39  | 40  | 41  | 42  | <b>Grand Tota</b> |
| 1        | Grand Manan       | Average of MEAN_LEN |      |        |      | 255   |     | 260 | 265 |     | 243 | 243 | 236 | 244 | 252 |     |     |     | 248 |     |     |     | 261 | 260 |     | 250 | 25                |
|          |                   | Sum of No. Samples  |      |        |      | 1     |     | 9   | 3   |     |     |     | 14  |     | _   |     |     |     | 1   |     |     |     | 1   | 10  |     | 3   | 83                |
| 2        | Long Island       | Average of MEAN_LEN |      |        |      | 219   | 229 | 245 | 235 | 252 | 242 |     | 255 | 255 | 263 |     |     | 219 | 242 | 214 | 227 | 227 | 196 | 187 | 189 | 228 | 229               |
|          |                   | Sum of No. Samples  |      |        |      | 18    | 17  | 2   | 16  | 12  | 8   |     | 1   | 1   | 2   |     |     | 2   | 4   | 4   | 10  | 3   | 7   | 5   | 1   | 1   | 114               |
| 3        | Trinity           | Average of MEAN_LEN |      |        |      |       |     |     |     |     |     |     |     | 264 | 266 |     |     |     |     |     |     |     |     |     |     |     | 266               |
|          |                   | Sum of No. Samples  |      |        |      |       |     |     |     |     |     |     |     | 5   | 11  |     |     |     |     |     |     |     |     |     |     |     | 16                |
| 4        | Lurcher           | Average of MEAN_LEN |      |        | 22   | 5 265 |     |     |     | 294 |     |     |     |     | 263 |     |     |     |     |     | 216 | 273 |     |     |     |     | 256               |
|          |                   | Sum of No. Samples  |      |        |      | 2 1   |     |     |     | 2   |     |     |     |     | 10  |     |     |     |     |     | 2   | 1   |     |     |     |     | 18                |
| 5        | Gannet, Dry Ledge | Average of MEAN_LEN |      |        | 22   | 1 266 |     |     |     |     | 253 | 263 | 246 | 267 |     | 232 |     |     |     |     |     | 271 |     | 269 | 270 |     | 256               |
|          |                   | Sum of No. Samples  |      |        |      | 1 4   |     |     |     |     | 3   | 9   | 3   | 4   |     | 2   |     |     |     |     |     | 2   |     | 1   | 2   |     | 31                |
| 6        | Seal Island       | Average of MEAN_LEN |      |        |      |       |     |     |     |     | 262 | 262 |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 262               |
|          |                   | Sum of No. Samples  |      |        |      |       |     |     |     |     | 1   | 9   |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 10                |
| 7        | German Bank       | Average of MEAN LEN |      |        |      |       |     |     |     |     | 257 | 266 | 262 | 270 |     |     |     |     | 271 | 271 | 270 | 273 | 274 | 274 | 255 |     | 268               |
|          |                   | Sum of No. Samples  |      |        |      |       |     |     |     |     | 8   | 2   | 9   | 2   |     |     |     |     | 3   | 24  | 12  | 12  | 2   | 12  | 5   |     | 91                |
| 8        | Scots Bay         | Average of MEAN LEN |      |        |      |       |     |     |     |     |     |     |     | 265 | 259 | 261 | 259 | 268 | 262 | 263 |     |     |     |     |     |     | 262               |
|          |                   | Sum of No. Samples  |      |        |      |       |     |     |     |     |     |     |     | 13  | 1   | 12  | 12  | 19  | 10  | 6   |     |     |     |     |     |     | 73                |
| 10       | N.B. Coastal      | Average of MEAN_LEN | 1    | 169 15 | 0    |       |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 242 | 188 | 187               |
|          |                   | Sum of No. Samples  |      | 3      | 2    |       |     |     |     |     |     |     |     |     | -   |     |     |     |     |     |     |     |     |     | 2   | 2   |                   |
| 11       | S.W. Grounds      | Average of MEAN_LEN |      |        |      |       |     |     |     |     | 257 |     |     |     |     |     |     |     |     | 239 |     |     |     |     |     |     | 248               |
|          |                   | Sum of No. Samples  |      |        |      |       |     |     |     |     | 6   |     |     |     |     |     |     |     |     | 2   |     |     |     |     |     |     | 8                 |
| 13       | Yankee Bank       | Average of MEAN_LEN |      |        |      |       |     |     |     |     |     |     |     |     |     |     | 258 | 241 |     |     |     |     |     |     |     |     | 250               |
|          |                   | Sum of No. Samples  |      |        |      |       |     |     |     |     |     |     |     |     |     |     | 1   | 1   |     |     |     |     |     |     |     |     | 1                 |
| 17       | Western Hole      | Average of MEAN_LEN |      |        |      |       | 272 |     |     |     | 255 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 264               |
|          |                   | Sum of No. Samples  |      |        |      |       | 2   |     |     |     | 2   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 4                 |
| 19       | Shelburne         | Average of MEAN_LEN |      |        |      |       | 260 |     | 287 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 274               |
|          |                   | Sum of No. Samples  |      |        |      |       | 1   |     | 2   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |                   |
| 20       | Offshore Banks    | Average of MEAN_LEN |      |        | 28   | )2    | 282 | 290 | 287 | 292 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 289               |
|          |                   | Sum of No. Samples  |      |        |      | 1     | 3   | 5   | 9   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 25                |
| Total A  | verage of MEAN_LE | N                   | 1    | 169 15 | 0 24 | 6 245 | 261 | 265 | 268 | 283 | 253 | 258 | 250 | 261 | 262 | 247 | 259 | 243 | 257 |     |     |     |     |     |     |     |                   |
| Total Si | um of No. Samples |                     |      | 3      | 2    | 4 24  | 23  | 16  | 30  | 21  | 42  | 43  | 27  | 27  | 26  | 14  | 13  | 22  | 18  | 36  | 24  | 18  | 10  | 28  | 10  | 6   | 487               |

THURSDAY, AFRIL 6, 2006 10:46:13.027 AM

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ADAPT W Ver. 3.0

Workspace size = 16000000

| Catch   |        |         |        |        |        |        |        |        |       |         |       |
|---------|--------|---------|--------|--------|--------|--------|--------|--------|-------|---------|-------|
| 546511  | 1      | 2       | 3      | 4      | 5      | 6      | 7      | 8      | 9     | 10      | 11    |
| 1965.00 | 270378 | 1084719 | 34835  | 234383 | 49925  | 10592  | 1693   | 561    | 54    | 37      | 1     |
| 1966.00 | 154323 | 914093  | 448940 | 73382  | 321857 | 45916  | 13970  | 7722   | 1690  | 215     | 1     |
| 1967.00 | 722208 | 613970  | 153626 | 266454 | 110051 | 159203 | 57948  | 4497   | 409   | 296     | 148   |
| 1968.00 | 164703 | 2389061 | 224956 | 83109  | 290285 | 73087  | 90617  | 31977  | 15441 | 5668    | 1175  |
| 1969.00 | 108875 | 290329  | 531812 | 132319 | 162439 | 112631 | 62506  | 22595  | 6345  | 2693    | 722   |
| 1970.00 | 699720 | 576896  | 76532  | 286278 | 201215 | 120280 | 111937 | 41257  | 21271 | 7039    | 2674  |
| 1971.00 | 87570  | 404224  | 183896 | 106630 | 113566 | 75593  | 93620  | 50022  | 36618 | 753€    | 5695  |
| 1972.00 | 0      | 649254  | 71984  | 148516 | 77207  | 75384  | 49065  | 48700  | 26055 | 13792   | 11679 |
| 1973.00 | 1018   |         | 781061 | 130851 | 40128  | 30334  | 2204€  | 20249  | 23871 | 11630   | 13386 |
| 1974.00 | 18411  | 766064  | 93606  | 803651 | 68276  | 19093  | 10232  | 6565   | 12786 | 7102    | 9031  |
| 1975.00 | 3199   | 317641  | 239827 | 124599 | 514605 | 66302  | 12298  | 4409   | 4778  | 3847    | 6225  |
| 1976.00 | 240    | 55596   | 206535 | 153782 | 68804  | 268839 | 21460  | 5571   | 3951  | 2059    | 3446  |
| 1977.00 | 1170   | 153921  | 31572  | 218478 | 119234 | 51173  | 177247 | 13977  | 3170  | 1415    | 3894  |
| 1978.00 | 35381  | 383611  | 40887  | 12906  | 122108 | 68410  | 31088  | 108975 | 11082 | 2425    | 1676  |
| 1979.00 | 342    | 183982  | 250393 | 54620  | 5430   | 23142  | 18255  | 11836  | 41389 | 4527    | 2411  |
| 1980.00 | 2339   | 12503   | 80518  | 474091 | 27930  | 4373   | 4692   | 6560   | 2985  | 10641   | 2739  |
| 1981.00 | 0      | 103051  | 50883  | 102743 | 451482 | 32978  | 2418   | 27€7   | 1917  | 538     | 2149  |
| 1982.00 | 3589   | 102133  | 150764 | 22640  | 9820€  | 211043 | 14627  | 2080   | 1354  | 1250    | 1014  |
| 1983.00 | 5488   | 191682  | 150328 | 244007 | 24483  | 60678  | 89982  | 10352  | 1728  | 642     | 1324  |
| 1984.00 | 0      | 88433   | 243542 | 224354 | 146096 | 22716  | 21654  | 28299  | 9515  | 2163    | 9000  |
| 1985.00 | 9022   | 216740  | 337591 | 302782 | 147670 | 42404  | 14075  | 18178  | 7997  | 1201    | 470   |
| 1986.00 | 63     | 125300  | 275903 | 292792 | 56937  | 31599  | 10770  | 4320   | 2942  | 1356    | 349   |
| 1987.00 | 2300   | 82940   | 12643€ | 527443 | 242597 | 45933  | 19481  | 7292   | 3361  | 3120    | 650   |
| 1988.00 | 151    | 148399  | 113208 | 19509€ | 434192 | 236089 | 42533  | 21208  | 4186  | 3797    | 2845  |
| 1989.00 | 8      | 101788  | 114095 | 61842  | 79451  | 169023 | 76684  | 18303  | 8270  | 3814    | 3057  |
| 1990.00 | 0      | 178532  | 130176 | 171560 | 89922  | 101066 | 201901 | 116788 | 31466 | 10572   | 6848  |
| 1991.00 | 0      |         | 179463 | 183647 | 88431  | 41352  | 50380  | 80732  | 45516 | 18291   | 13524 |
| 1992.00 | 9      |         | 132642 | 286923 | 126510 | 75473  | 34458  | 35369  | 59136 | 34558   | 20653 |
| 1993.00 | 166    |         | 43766  | 194198 | 130713 | 67708  | 33820  | 21481  | 21893 | 20684   | 11175 |
| 1994.00 | 151    |         | 142260 | 53700  | 118015 | 72512  | 36059  | 14889  | 8706  | 10447   | 15533 |
| 1995.00 | 1631   |         | 219777 | 112245 | 36784  | 36402  | 22127  | 6474   | 4217  | 2957    | 3566  |
| 1996.00 | 0      |         | 37715  | 256063 | 54534  | 16862  | 9151   | 3300   | 1782  | 1310    | 1605  |
| 1997.00 | 356    |         | 87395  | 78098  | 131062 | 18917  | 5131   | 3636   | 894   | 620     | 874   |
| 1998.00 | 137    |         | 62322  | 138751 | 97065  | 97464  | 20679  | 3856   | 1730  | 1288    | 398   |
| 1999.00 | 2694   |         | 223283 | 147840 | 131463 | 57291  | 10044  | 613    | 212   | 70      | 13    |
| 2000.00 | 841    |         | 75330  | 108560 | 124083 | 60754  | 25829  | 4454   | 251   | 33      | 23    |
| 2001.00 | 51     |         | 325273 | 57175  | 60409  | 31891  | 15509  | 2203   | 304   | 8<br>23 | 4 3   |
| 2002.00 | 15500  |         | 98597  | 210620 | 75256  | 27973  | 12846  | 1577   | 70    |         |       |
| 2003.00 | 459    |         | 342592 | 114850 | 96847  | 13111  | 7136   | 435    | 23    | 0       | 0     |
| 2004.00 | 3142   |         | 347693 | 132570 | 79884  | 9351   | 3226   | 339    | 36    | 2       | 0     |
| 2005.00 | 135    | 72039   | 171155 | 180893 | 28030  | 4286   | 1050   | 49     | 2     | 2       | U     |
| 2006 00 |        |         |        |        |        |        |        |        |       |         |       |

| Acoustic O |             |           |         |           |            |                 |
|------------|-------------|-----------|---------|-----------|------------|-----------------|
|            | 2           | 3         | 4       | 5         | 6 7        | 8 9             |
| 1999.65    | 22.2511836  | .78 ***** | ******  |           | ******     | 5774.58 6645.49 |
| 2000.65**  |             |           | ******  | *****     | ********   | 7272.51 2018.98 |
| 2001.6587  | 169.63****  |           |         |           | ********   | 5436.16 2177.56 |
| 2002.6581  | 122.11***** |           | ******  | *******   | *********1 | 7361.89 798.75  |
| 2003 65**  |             |           | ******* | *******   | **59548.39 | 2080.84 0.82    |
| 2004 6525  | 675.28****  |           | ******  |           | **47311.95 | 3274.62 2271.29 |
| 2005 65 3  | 705 11+++++ |           |         | ***50696. | 0715687.01 | 629.27 0.00     |

Index Type and Model Form

ID# p Label p Age Group(s) p Index Type p Model Form

1 Acoustic Overall 2 Abundance Proportional

2 Acoustic Overall 3 Abundance Proportional

3 Acoustic Overall 4 Abundance Proportional

4 Acoustic Overall 5 Abundance Proportional

5 Acoustic Overall 6 Abundance Proportional

```
6 Acoustic Overall 7 Abundance Proportional
     7 Acoustic Overall 8 Abundance Proportional
     8 Acoustic Overall 9 Abundance Proportional
    Index Inclusion
    ID# on same line have common catchability
   VPA setup
   Plus Group : Yes, using FIRST method
   Population
                                 3
                                        4
    1965.00
                                                        6
                                                                 7
                                                                         8
                                                                                                  11+
    2005.00******
    2006.00******
                                                                                                  (500)
   F ratios
                                                                5000
                                 3
                                         4
    1965.00
                                                                          8
                                                                                                  11+
   1966.00
                                                        1.00
                                                               1.00
                                                                        1.00
                                                                                1.00 **wtd**
    1967.00
                                                               1.00
                                                                        1.00
                                                                                1.00
                                                                                      **wtd**
    1968.00
                                                        1.00
                                                               1.00
                                                                        1.00
                                                                                1.00
                                                                                      **wtd**
   1969.00
                                                       1.00
                                                               1.00
                                                                        1.00
                                                                                1.00
                                                                                       **wtd**
   1970.00
                                                       1.00
                                                               1.00
                                                                        1.00
                                                                                      **Wtd**
                                                                                1.00
   1971.00
                                                       1.00
                                                               1.00
                                                                        1.00
                                                                                1.00
                                                                                      **wtd**
   1972.00
                                                       1.00
                                                               1.00
                                                                       1.00
                                                                                      **Wtd**
                                                                                1.00
   1973.00
                                                       1.00
                                                               1.00
                                                                        1.00
                                                                                      **wtd**
                                                                                1.00
   1974.00
                                                       1.00
                                                               1.00
                                                                       1.00
                                                                                1.00
                                                                                      **Wtd**
   1975.00
                                                       1.00
                                                               1.00
                                                                       1.00
                                                                                1.00 **wtd**
   1976.00
                                                       1.00
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                                                                                      **wtd**
   1977.00
                                                       1.00
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                                                                                     **Wtd**
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   1978.00
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   1979.00
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                                                                                     **Wtd**
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   1980.00
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   1981.00
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                                                                                     **Wtd**
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   1982.00
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                                                                                     **wtd**
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   1983.00
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                                                                                     **Wtd**
   1984.00
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                                                                                     **WEG##
  1985.00
                                                      1.00
                                                              1.00
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                                                                               1.00
                                                                                     **wtd**
  1986.00
                                                      1.00
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                                                                                     **Wtd**
                                                                               1.00
  1987.00
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                                                                                     **Wtd**
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  1988.00
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                                                                                     **wtd**
  1989.00
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  1990.00
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  1991.00
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  1992.00
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  1993.00
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                                                                                     **wtd**
  1994.00
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  1995.00
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 1996.00
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 1997.00
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 1998.00
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 1999.00
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                                                                                    **Wtd**
 2000.00
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                                                              1.00
                                                                      1.00
                                                                             1.00 **wtd**
 2001.00
                                                     1.00
                                                             1.00
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                                                                              1.00
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 2002.00
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                                                             1.00
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 2002.00
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                                                             1.00
                                                                     1.00
                                                                            **wtd**
 2004.00
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 2005.00
                                                     1.00
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                                                                     1.00
                                                                             1.00 **wtd**
 2005.00
                                                     0.20
 2005.00
                                                     0.40
                                *******
 2005.00
                                                     0.70
 2005.00
                                                     0.90
 2005.00
                                                     1.00 *******
 2005.00
                                                     1.00
                                                                 ******
2005.00
                                                     1.00
                                                                         *******
Natural Mortality
                                                    1.00
1965.00 (0.20) (0.20) (0.20) (0.20) (0.20) (0.20) 1967.00 (0.20) (0.20) (0.20) (0.20) (0.20)
                                                      6
                                                  (0.20) (0.20) (0.20) (0.20) (0.20) (0.20) (0.20) (0.20) (0.20) (0.20) (0.20) (0.20) (0.20) (0.20) (0.20) (0.20)
```

| 1000 00   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  |
|---|---|--|---|--|---|--|--|---|---|---|---|
| 1968.00   |   |  |   | (0.20)   | (0.20)  | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  |
| 1969.00   | (0.20)  | (0.20)   | (0.20)  |  |   |  |  | (0.20)  | (0.20)  | (0.20)  | (0.20)  |
| 1970.00   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)   |   |   |   | (0.20)  |
| 1971.00   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  |   |
| 1972.00   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  |
|   |   |  | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  |
| 1973.00   | (0.20)  | (0.20)   |   |  |   | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  |
| 1974.00   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)  |  |  |   | (0.20)  | (0.20)  | (0.20)  |
| 1975.00   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)   | (0.20)  |   |   |   |
| 1976.00   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  |
|   |   |  | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  |
| 1977.00   | (0.20)  | (0.20)   |   |  |   | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  |
| 1978.00   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)  |  |  |   | (0.20)  | (0.20)  | (0.20)  |
| 1979.00   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)   | (0.20)  |   |   |   |
| 1980.00   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  |
|   |   | (0.20)   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  |
| 1981.00   | (0.20)  |  |   | (0.20)   | (0.20)  | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  |
| 1982.00   | (0.20)  | (0.20)   | (0.20)  |  |   |  |  | (0.20)  | (0.20)  | (0.20)  | (0.20)  |
| 1983.00   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)   |   |   |   | (0.20)  |
| 1984.00   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  |   |
| 1985.00   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  |
|   |   |  | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  |
| 1986.00   | (0.20)  | (0.20)   |   |  |   | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  |
| 1987.00   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)  |  |  |   |   | (0.20)  | (0.20)  |
| 1988.00   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)   | (0.20)  | (0.20)  |   |   |
| 1989.00   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  |
|   |   |  | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  |
| 1990.00   | (0.20)  | (0.20)   |   |  | (0.20)  | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  |
| 1991.00   | (0.20)  | (0.20)   | (0.20)  | (0.20)   |   |  |  | (0.20)  | (0.20)  | (0.20)  | (0.20)  |
| 1992.00   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)   |   |   | (0.20)  | (0.20)  |
| 1993.00   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)   | (0.20)  | (0.20)  |   |   |
| 1994.00   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  |
|   |   |  |   | (0.20)   | (0.20)  | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  |
| 1995.00   | (0.20)  | (0.20)   | (0.20)  |  |   |  | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  |
| 1996.00   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)  | (0.20)   |  |   |   | (0.20)  | (0.20)  |
| 1997.00   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)   | (0.20)  | (0.20)  |   |   |
| 1998.00   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  |
|   |   |  | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  |
| 1999.00   | (0.20)  | (0.20)   |   |  |   | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  |
| 2000.00   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)  |  |  |   | (0.20)  | (0.20)  | (0.20)  |
| 2001.00   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)   | (0.20)  |   |   |   |
| 2002.00   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  |
|   |   | (0.20)   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  |
| 2003.00   | (0.20)  |  |   |  | (0.20)  | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  |
| 2004.00   | (0.20)  | (0.20)   | (0.20)  | (0.20)   |   |  |  | (0.20)  | (0.20)  | (0.20)  | (0.20)  |
| 2005.00   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)  | (0.20)   | (0.20)   | 10.201  | forres  | 4-1   |   |
|   |   |  |   |  |   |  |  |   |   |   |   |
| Virtual F   | opulatio  | n Analys   | is using  | initial  | values  |  |  |   |   |   |   |
| Virtual F   | opulatio  | n Analys   | is using  | initial  | values  |  |  |   |   |   |   |
| Virtual F   |   |  | is using  | initial  | values  |  |  |   |   |   |   |
| Virtual F   | n Number  | s  |   |  |   | 6  | 7  | 8   | 9   | 10  | 11+   |
| Virtual F   | n Number  | :s<br>2  | 3   | 4  | 5   | 52556  | 7  |   |   |   | 11+<br>500  |
| Virtual F<br>Population<br>1965.00  | n Number<br>1<br>3503534  | 3848688  | 3<br>995990   | 4<br>1312007   | 5<br>348049   | 92556  | 44658  | 4104  | 1354  | 406   | 500   |
| Virtual F<br>Population<br>1965.00  | n Number<br>1<br>3503534<br>2737874   | 2<br>3848688<br>2624572  | 3<br>995990<br>2177169  | 4<br>1312007<br>784001   | 5<br>348049<br>863223   | 92556<br>239988  | 44658<br>66231   | 4104<br>35035   | 1354<br>2855  | 406<br>1060   | 500<br>707  |
| Virtual F<br>Population<br>1965.00  | n Number<br>1<br>3503534<br>2737874   | 2<br>3848688<br>2624572  | 3<br>995990<br>2177169  | 4<br>1312007<br>784001   | 5<br>348049   | 92556  | 44658<br>66231<br>155171   | 4104<br>35035<br>41661  | 1354<br>2855<br>21740   | 406<br>1060<br>836  | 500<br>707<br>1253  |
| Virtual F<br>Population<br>1965.00<br>1966.00<br>1967.00  | n Number<br>1<br>3503534<br>2737674<br>6078739  | 2<br>3848688<br>2624572<br>2102325   | 3<br>995990<br>2177169<br>1329624   | 4<br>1312007<br>784001<br>1378701  | 5<br>348049<br>863223<br>575717   | 92556<br>239988  | 44658<br>66231   | 4104<br>35035   | 1354<br>2855  | 406<br>1060<br>836<br>17430   | 500<br>707<br>1253<br>1311  |
| Virtual F<br>Population<br>1965.00<br>1966.00<br>1967.00<br>1968.00   | n Number<br>1<br>3503534<br>2737874<br>6078739<br>1286168   | 3848688<br>2624572<br>2102325<br>4325977   | 3<br>995990<br>2177169<br>1329624<br>1170158  | 4<br>1312007<br>784001<br>1378701<br>950142  | 5<br>348049<br>863223<br>575717<br>889042   | 92556<br>239988<br>418512<br>372334  | 44658<br>66231<br>155171<br>200109   | 4104<br>35035<br>41661<br>75150   | 1354<br>2855<br>21740   | 406<br>1060<br>836  | 500<br>707<br>1253  |
| Virtual F<br>Population<br>1965.00<br>1966.00<br>1967.00<br>1968.00<br>1969.00  | n Number<br>1<br>3503534<br>2737874<br>6078739<br>1286168<br>1754254  | 2<br>3848688<br>2624572<br>2102325<br>4325977<br>904620  | 3<br>995990<br>2177169<br>1329624<br>1170158<br>1415817   | 4<br>1312007<br>784001<br>1378701<br>950142<br>755635  | 5<br>348049<br>863223<br>575717<br>889042<br>702962   | 92556<br>239988<br>418512<br>372334<br>467578  | 44658<br>66231<br>155171<br>200109<br>239085   | 4104<br>35035<br>41661<br>75150<br>82892  | 1354<br>2855<br>21740<br>30056<br>32938   | 406<br>1060<br>836<br>17430<br>10845  | 500<br>707<br>1253<br>1311  |
| Virtual F<br>Population<br>1965.00<br>1966.00<br>1967.00<br>1968.00<br>1969.00<br>1970.00   | n Number<br>1<br>3503534<br>2737874<br>6078739<br>1286168<br>1754254<br>2304087   | 2<br>3848688<br>2624572<br>2102325<br>4325977<br>904620<br>1338027   | 3<br>995990<br>2177169<br>1329624<br>1170158<br>1415817<br>480252   | 4<br>1312007<br>784001<br>1378701<br>950142<br>755635<br>682955  | 5<br>348049<br>863223<br>575717<br>889042<br>702962<br>499558   | 92556<br>239988<br>418512<br>372334<br>467578<br>429512  | 44658<br>66231<br>155171<br>200109<br>239085<br>281595   | 4104<br>35035<br>41661<br>75150<br>82892<br>139599  | 1354<br>2855<br>21740<br>30056<br>32938<br>47575  | 406<br>1060<br>836<br>17430<br>10845<br>21258   | 500<br>707<br>1253<br>1311<br>9244<br>13377   |
| Virtual F<br>Population<br>1965.00<br>1966.00<br>1967.00<br>1968.00<br>1969.00<br>1970.00   | n Number<br>1<br>3503534<br>2737874<br>6078739<br>1286168<br>1754254<br>2304087   | 2<br>3848688<br>2624572<br>2102325<br>4325977<br>904620<br>1338027   | 3<br>995990<br>2177169<br>1329624<br>1170158<br>1415817   | 4<br>1312007<br>784001<br>1378701<br>950142<br>755635  | 5<br>348049<br>863223<br>575717<br>889042<br>702962<br>499558<br>303152   | 92556<br>239988<br>418512<br>372334<br>467578<br>429512<br>228973  | 44658<br>66231<br>155171<br>200109<br>239085<br>281595<br>243661   | 4104<br>35035<br>41661<br>75150<br>82892<br>139599<br>130382  | 1354<br>2855<br>21740<br>30056<br>32938<br>47575<br>77266   | 406<br>1060<br>836<br>17430<br>10845<br>21258<br>19947  | 500<br>707<br>1253<br>1311<br>9244<br>13377<br>19640  |
| Virtual F<br>Population<br>1965.00<br>1966.00<br>1967.00<br>1969.00<br>1970.00<br>1971.00   | n Number<br>1<br>3503534<br>2737874<br>6078739<br>1286168<br>1754254<br>2304087<br>7460417  | 3848688<br>2624572<br>2102325<br>4325977<br>904620<br>1338027<br>1258574   | 3<br>995990<br>2177169<br>1329624<br>1170158<br>1415817<br>480252<br>579796   | 4<br>1312007<br>784001<br>1378701<br>950142<br>755635<br>682955<br>324285  | 5<br>348049<br>863223<br>575717<br>889042<br>702962<br>499558   | 92556<br>239988<br>418512<br>372334<br>467578<br>429512  | 44658<br>66231<br>155171<br>200109<br>239085<br>281595   | 4104<br>35035<br>41661<br>75150<br>82892<br>139599<br>130382<br>115682  | 1354<br>2855<br>21740<br>30056<br>32938<br>47575<br>77266<br>61966  | 406<br>1060<br>836<br>17430<br>10845<br>21258<br>19947<br>30575   | 500<br>707<br>1253<br>1311<br>9244<br>13377<br>19640<br>20551   |
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| Virtual F Populatic 1965.00 1966.00 1966.00 1968.00 1970.00 1971.00 1971.00 1973.00 1974.00 1975.00 1977.00 1978.00 1978.00 1978.00 1988.00 1988.00 1988.00 1988.00 1988.00 1989.00 1989.00 1989.00 1989.00   | n Number  1 3503534 2737874 6078739 1286168 1754254 2304087 7460417 1138007 2336523 1625829 247148 721820 4140081 1346539 449147 1572597 1669558 2302838 4078526 5027282 18397308 1401917 1744614 1185719 579910 824078   | 2 3848688 2624572 2102325 4325977 904600 1338027 1258574 6028985 931722 1912063 1314489 159458 590760 3386555 1070508 367422 1285420 1366918 1882162 3334258 4115990 1491259 867547 1141942 1147656 1428362 970785 474790 674690                       | 3<br>995990<br>2177169<br>1329624<br>1170158<br>1415817<br>480252<br>579796<br>667899<br>4350854<br>612115<br>880008<br>790742<br>113384<br>345406<br>2428553<br>710839<br>289532<br>959467<br>1027010<br>1368174<br>2650014<br>3174295<br>1107935<br>635504<br>801233<br>847830<br>1008567<br>707394<br>237693                               | 1312007<br>784001<br>1378701<br>950142<br>755635<br>682955<br>324285<br>309749<br>481941<br>2859195<br>416859<br>505119<br>461878<br>64483<br>245946<br>1762596<br>509412<br>191249<br>649785<br>705445<br>900962<br>1865457<br>2350078<br>793142<br>416412<br>553220<br>576914<br>64216<br>459804                 | 5<br>348049<br>863223<br>575717<br>885042<br>702962<br>499558<br>303152<br>2169889<br>121063<br>277069<br>1619372<br>229479<br>275572<br>183136<br>41184<br>152252<br>1017308<br>324646<br>136177<br>313499<br>376337<br>466203<br>1263651<br>1449860<br>474051<br>286868<br>299026<br>307618<br>287340                             | 92556<br>239988<br>418512<br>372334<br>467578<br>429512<br>228973<br>146502<br>70132<br>63139<br>165491<br>864256<br>126138<br>119041<br>41880<br>28826<br>99518<br>429491<br>177675<br>89457<br>126231<br>175953<br>330385<br>816306<br>797404<br>316593<br>165457<br>138696  | 44658 66231 155171 200109 239085 243661 119687 52761 30305 34561 76167 466414 57492 36645 13695 19663 51910 163382 91079 52832 65334 115618 229118 4564413 500847 168557 89111                             | 4104<br>35035<br>41661<br>75150<br>62892<br>139599<br>130382<br>115682<br>54102<br>23481<br>15639<br>17278<br>43093<br>223170<br>19392<br>13722<br>7007<br>13919<br>29368<br>53687<br>55107<br>30614<br>43794<br>77122<br>149310<br>304643<br>229416<br>92791<br>42113                            | 1354<br>2855<br>21740<br>30056<br>32938<br>47575<br>77266<br>61966<br>51165<br>26162<br>13330<br>8846<br>9149<br>22748<br>85497<br>5372<br>5380<br>3261<br>9523<br>14768<br>28818<br>21173<br>29291<br>144058<br>105751<br>144866<br>115487<br>44305                                  | 406<br>1060<br>836<br>17430<br>10845<br>21258<br>19947<br>30575<br>27434<br>20577<br>10013<br>6633<br>3712<br>4650<br>8737<br>33069<br>1742<br>2687<br>1459<br>6242<br>3661<br>8199<br>20942<br>14308<br>20211<br>28662<br>58343<br>77777<br>41843  | 500<br>707<br>1253<br>1311<br>9244<br>13377<br>19640<br>20551<br>19153<br>15921<br>15485<br>11863<br>6640<br>5577<br>5530<br>19616<br>15067<br>12505<br>9665<br>3339<br>4231<br>8641<br>20824<br>22791<br>29020<br>31602<br>49143<br>51315  |
| Virtual F Populatic 1965.00 1966.00 1966.00 1968.00 1970.00 1971.00 1971.00 1973.00 1974.00 1975.00 1977.00 1978.00 1978.00 1978.00 1988.00 1988.00 1988.00 1988.00 1988.00 1989.00 1989.00 1989.00 1989.00   | n Number  1 3503534 2737874 6078739 1286168 1754254 2304087 7460417 1138007 2336523 1625829 247148 721820 4140081 1346539 449147 1572597 1669558 2302838 4078526 5027282 18397308 1401917 1744614 1185719 579910 824078   | 2 3848688 2624572 2102325 4325977 904670 338027 1258574 6028985 2931722 1912063 1314489 199458 367422 1285420 1366918 1882162 3334258 4115990 1491259 867547 1141942 1147656 1428362 970785 474790 1366972   | 995990<br>2177169<br>1329624<br>1170158<br>1415817<br>480252<br>579796<br>667899<br>4350854<br>612115<br>880008<br>790742<br>13384<br>345406<br>2428553<br>710239<br>289532<br>959467<br>1027010<br>1368174<br>2650014<br>3174295<br>635504<br>801233<br>847830<br>1008567<br>707394<br>237693<br>483523                                      | 1312007<br>784001<br>1378701<br>950142<br>755635<br>682955<br>324285<br>309749<br>481941<br>2859195<br>416859<br>505119<br>505119<br>505119<br>64483<br>245946<br>1762596<br>509412<br>191249<br>649785<br>705445<br>900962<br>1865457<br>793142<br>416412<br>576914<br>64216<br>459804<br>155220                  | 5<br>348049<br>863223<br>575717<br>889042<br>702962<br>499558<br>303152<br>169899<br>121063<br>277069<br>1619372<br>229479<br>275572<br>183136<br>41184<br>152252<br>1017308<br>324646<br>136177<br>313499<br>376337<br>466203<br>1263651<br>1449860<br>474051<br>286668<br>299026<br>307618<br>287340<br>202812                    | 92556<br>239988<br>418512<br>372334<br>467578<br>429512<br>228973<br>146502<br>70132<br>63139<br>165491<br>864256<br>126138<br>119041<br>41880<br>28826<br>99518<br>429491<br>177675<br>89457<br>126231<br>175953<br>330385<br>816306<br>797404<br>316593<br>154203<br>165457<br>138696<br>118503                            | 44658 66231 155171 200109 239085 243661 119687 52761 30305 34561 76167 466414 57492 36645 13695 19663 51910 163382 91079 52832 65334 115618 229118 456413 500847 168557 89111 68056 53150                  | 4104<br>35035<br>41661<br>75150<br>82892<br>139599<br>130382<br>115682<br>54102<br>23481<br>15639<br>17278<br>43093<br>223170<br>19392<br>7007<br>13919<br>29368<br>53687<br>55107<br>30614<br>43794<br>77122<br>149310<br>304643<br>229416<br>92791<br>42113<br>25557                            | 1354<br>2855<br>21740<br>30056<br>32938<br>47575<br>77266<br>61966<br>51165<br>26162<br>13330<br>8846<br>9149<br>22748<br>85497<br>5372<br>5380<br>3261<br>9523<br>14768<br>18746<br>28818<br>21173<br>29291<br>44098<br>21173<br>29291<br>44098<br>115487<br>44098<br>15497<br>44098 | 406<br>1060<br>836<br>17430<br>10845<br>21258<br>19947<br>30575<br>27434<br>20577<br>10013<br>6633<br>3712<br>4650<br>8737<br>33069<br>1742<br>2687<br>1459<br>6242<br>3661<br>8199<br>20942<br>14308<br>20211<br>28662<br>58343<br>77777<br>41843<br>16747   | 500<br>707<br>1253<br>1311<br>9244<br>13377<br>19640<br>20551<br>19153<br>15921<br>15485<br>10203<br>6640<br>5577<br>1530<br>19616<br>15067<br>1205<br>9665<br>3339<br>4231<br>8641<br>20824<br>22791<br>29020<br>31602<br>45143<br>51315<br>47773                                      |
| Virtual F Populatio 1965.00 1966.00 1966.00 1968.00 1970.00 1971.00 1972.00 1973.00 1974.00 1975.00 1976.00 1978.00 1978.00 1978.00 1978.00 1988.00 1988.00 1988.00 1988.00 1988.00 1988.00 1988.00 1988.00 1989.00 1989.00 1989.00 1989.00 1989.00   | n Number 1 3503534 2737874 6078739 1286168 1754254 2304087 7460417 1138007 2336523 1625829 247148 721820 4140081 134€539 449147 1572597 1669558 2302838 4078526 5027282 1831381 1059694 1397308 1401917 1744614 1185719 579910 824078 1669807   | 2 3848688 2624572 2102325 4325977 904670 1338027 1258574 6028985 2912063 1314489 199458 367422 1285420 1366918 1882162 3334258 4115990 1491259 867547 1141942 1147656 1428362 970785 474790 1366972  | 995990<br>2177169<br>1329624<br>1170158<br>1415817<br>480252<br>579796<br>667899<br>4350854<br>612115<br>880008<br>790742<br>13384<br>345406<br>2428553<br>710239<br>289532<br>959467<br>1027010<br>1368174<br>2650014<br>3174295<br>635504<br>801233<br>847830<br>1008567<br>707394<br>237693<br>483523              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| Virtual F Populatic 1965.00 1966.00 1966.00 1967.00 1968.00 1971.00 1971.00 1972.00 1973.00 1976.00 1976.00 1976.00 1978.00 1978.00 1978.00 1978.00 1980.00 1981.00 1982.00 | n Number  1 3503534 2737874 6078739 1286168 1754254 2304087 7460417 1138007 2336523 1625829 247148 721820 4140081 1346539 449147 1572597 1669558 2302838 40778526 5027282 1831381 1059694 1397308 1401917 1744614 1185719 824078 1669807 877050 1031472   | 2 3848688 2624572 2102325 4325977 90460 1338027 1258574 6028985 931722 1912063 1314489 199458 590760 3388555 1070508 367422 1285420 1366918 1882162 1285420 1491259 867547 1141942 1147656 1428362 1270785 474790 6746900 1366972 717932               | 995990<br>2177169<br>1329624<br>1170158<br>1415817<br>480252<br>579796<br>667899<br>4350854<br>612115<br>880008<br>790742<br>113384<br>345406<br>2428553<br>710839<br>289532<br>559467<br>1027010<br>1368174<br>2650014<br>3174295<br>1107935<br>635504<br>801233<br>847830<br>1008567<br>707394<br>237693<br>483523<br>1025476               | 1312007<br>784001<br>1378701<br>950142<br>755635<br>682955<br>324285<br>309749<br>416859<br>505119<br>416859<br>505119<br>416878<br>64483<br>245946<br>1762596<br>509412<br>191249<br>649785<br>705445<br>900962<br>1865457<br>793142<br>416412<br>553220<br>576914<br>644216<br>459804<br>4155220<br>268195       | 5<br>348049<br>663223<br>575717<br>889042<br>702962<br>499558<br>303152<br>169889<br>121063<br>277069<br>1619372<br>229479<br>275572<br>183136<br>41184<br>136177<br>313499<br>376337<br>466203<br>1263651<br>1449860<br>474051<br>286868<br>299026<br>307618<br>287340<br>202812<br>78955  | 92556<br>239988<br>418512<br>372334<br>467578<br>429512<br>228973<br>146502<br>70132<br>63139<br>165491<br>41880<br>28826<br>69518<br>429491<br>177675<br>89457<br>126231<br>175953<br>330385<br>816306<br>797404<br>316593<br>154203<br>165457<br>138696<br>118503<br>61164   | 44658 66231 155171 200109 239085 243661 119687 52761 30305 34561 76167 466414 57492 36645 13695 19663 51910 163382 91079 52832 65334 115618 456413 500847 168557 89111 68056 53150 32668                   | 4104<br>35035<br>41661<br>75150<br>62892<br>139599<br>130382<br>115682<br>54102<br>23481<br>15639<br>17278<br>43093<br>223170<br>19392<br>13722<br>7007<br>13919<br>29368<br>53687<br>755107<br>30614<br>43794<br>43794<br>43794<br>149310<br>304643<br>229416<br>92791<br>42113<br>25557<br>7177 | 1354<br>2855<br>21740<br>30056<br>32938<br>47575<br>77266<br>61966<br>51165<br>26162<br>13330<br>8846<br>9149<br>22748<br>85497<br>5372<br>5380<br>3261<br>9523<br>14768<br>21173<br>29291<br>44098<br>105751<br>144866<br>115487<br>44305<br>15331<br>7693<br>3759                   | 406<br>1060<br>836<br>17430<br>10845<br>21258<br>19947<br>30575<br>27434<br>20577<br>10013<br>6633<br>3712<br>4650<br>8737<br>33069<br>1742<br>2687<br>1459<br>6242<br>14306<br>20211<br>28662<br>14308<br>20212<br>2862<br>14308<br>20214<br>28634<br>37777<br>41843<br>16747<br>4810<br>2545  | 500<br>707<br>1253<br>1311<br>9244<br>13377<br>19640<br>20551<br>19153<br>15921<br>15485<br>11863<br>10203<br>6640<br>5577<br>5530<br>19616<br>15067<br>12505<br>9665<br>3339<br>4231<br>8641<br>20824<br>22791<br>29020<br>31602<br>31602<br>31602<br>31773<br>29629<br>22358          |
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| 1998.00     | 619708    | 974143  | 561228 | 458528 | 227441 | 125595 | 23094 | 4439  | 1984  | 1596  | 14426 |
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| 1999.00     |           | 507250  | 559670 | 403319 | 250907 | 99434  | 17222 | 1005  | 282   | 121   | 11630 |
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| 2001.00     |           |         | 408314 | 375233 | 103608 | 39933  | 14190 | 1682  | 88    | 29    | 6387  |
|             |           | 1142925 |        |        | 119859 | 18475  | 7989  | 518   | 26    | 11    | 5230  |
|             |           | 1698873 |        | 245688 | 98615  | 13315  | 3554  | 361   | 45    | 1     | 4291  |
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| 2005.00     |           | 737133  | 923717 | 603204 | 76483  | 37512  | 5000  | 1225  | 57    | 2     | 2879  |
| 2006.00     | 1000000   | 818609  | 538562 | 602250 | 331532 | 3/312  | 2000  | 1623  | 31    | ~     | 2012  |
| Fishing M   | fortality | v       |        |        |        |        |       |       |       |       |       |
| . Longing . | 1         | 2       | 3      | 4      | 5      | 6      | 7     | 8     | 9     | 10    | 11+   |
| 1965.00     | 0.089     | 0.370   | 0.039  | 0.219  | 0.172  | 0.135  | 0.043 | 0.163 | 0.045 | 0.106 | 0.002 |
| 1966.00     | 0.064     | 0.480   | 0.257  | 0.109  | 0.524  | 0.236  | 0.264 | 0.277 | 1.028 | 0.252 | 0.002 |
| 1967.00     | 0.140     | 0.386   | 0.136  | 0.239  | 0.236  | 0.538  | 0.525 | 0.127 | 0.021 | 0.490 | 0.139 |
| 1968.00     | 0.152     | 0.917   | 0.237  | 0.101  | 0.443  | 0.243  | 0.681 | 0.625 | 0.819 | 0.440 | 2.943 |
| 1969.00     | 0.071     | 0.433   | 0.529  | 0.214  | 0.293  | 0.307  | 0.338 | 0.355 | 0.238 | 0.318 | 0.090 |
| 1970.00     | 0.405     | 0.636   | 0.193  | 0.612  | 0.550  | 0.367  | 0.570 | 0.392 | 0.669 | 0.450 | 0.248 |
| 1971.00     | 0.013     | 0.434   | 0.427  | 0.446  | 0.527  | 0.449  | 0.545 | 0.544 | 0.727 | 0.533 | 0.383 |
| 1972.00     | 0.000     | 0.126   | 0.126  | 0.739  | 0.685  | 0.821  | 0.594 | 0.616 | 0.615 | 0.678 | 0.960 |
| 1973.00     | 0.000     | 0.220   | 0.220  | 0.354  | 0.451  | 0.639  | 0.610 | 0.527 | 0.711 | 0.622 | 1.402 |
|             |           |         | 0.184  | 0.369  | 0.315  | 0.403  | 0.462 | 0.366 | 0.760 | 0.475 | 0.958 |
| 1974.00     | 0.013     | 0.576   | 0.355  | 0.397  | 0.428  | 0.576  | 0.493 | 0.370 | 0.498 | 0.545 | 0.579 |
| 1975.00     |           |         | 0.338  | 0.406  | 0.398  | 0.417  | 0.370 | 0.436 | 0.668 | 0.416 | 0.383 |
| 1976.00     | 0.000     | 0.365   |        | 0.725  | 0.639  | 0.586  | 0.537 | 0.439 | 0.477 | 0.539 | 0.540 |
| 1977.00     | 0.000     | 0.337   | 0.364  | 0.248  | 1.275  | 0.978  | 0.887 | 0.759 | 0.757 | 0.838 | 0.324 |
| 1978.00     | 0.029     | 0.133   | 0.140  |        | 0.157  | 0.918  | 0.782 | 1.084 | 0.750 | 0.830 | 0.639 |
| 1979.00     | 0.001     | 0.209   | 0.121  | 0.280  | 0.225  | 0.183  | 0.470 | 0.736 | 0.926 | 0.435 | 0.776 |
| 1980.00     | 0.002     | 0.038   | 0.133  | 0.350  |        | 0.451  | 0.145 | 0.565 | 0.494 | 0.413 | 0.129 |
| 1981.00     | 0.000     | 0.092   | 0.215  | 0.251  | 0.662  | 0.767  | 0.370 | 0.180 | 0.604 | 0.708 | 0.077 |
| 1982.00     | 0.002     | 0.086   | 0.190  | 0.140  | 0.403  |        |       | 0.487 | 0.222 | 0.655 | 0.124 |
| 1983.00     | 0.001     | 0.119   | 0.176  | 0.529  | 0.220  | 0.468  | 0.913 |       | 1.195 | 0.483 | 3.753 |
| 1984.00     | 0.000     | 0.030   | 0.218  | 0.428  | 0.710  | 0.327  | 0.302 | 0.852 | 0.627 | 0.445 | 0.168 |
| 1985.00     | 0.005     | 0.060   | 0.151  | 0.459  | 0.560  | 0.459  | 0.346 |       |       | 0.201 | 0.095 |
| 1986.00     | 0.000     | 0.097   | 0.101  | 0.190  | 0.144  | 0.220  | 0.200 | 0.169 | 0.119 | 0.179 | 0.087 |
| 1987.00     | 0.002     | 0.111   | 0.134  | 0.283  | 0.237  | 0.166  | 0.205 | 0.202 |       | 0.179 | 0.163 |
| 1988.00     | 0.000     |         | 0.218  | 0.315  | 0.398  | 0.381  | 0.228 | 0.359 | 0.171 |       |       |
| 1989.00     | 0.000     | 0.103   | 0.170  | 0.177  | 0.204  | 0.265  | 0.204 | 0.145 | 0.231 | 0.232 | 0.160 |
| 1990.00     | 0.000     |         | 0.185  | 0.415  | 0.421  | 0.430  | 0.581 | 0.543 | 0.395 | 0.517 | 0.300 |
| 1991.00     | 0.000     |         |        | 0.429  | 0.392  | 0.348  | 0.397 | 0.486 | 0.422 | 0.421 |       |
| 1992.00     | 0.000     |         | 0.231  | 0.638  | 0.597  | 0.688  | 0.550 | 0.539 | 0.815 | 0.663 | 0.691 |
| 1993.00     | 0.000     |         |        | 0.619  | 0.686  | 0.759  | 0.779 | 0.810 | 0.773 | 0.773 | 0.273 |
| 1994.00     | 0.000     |         | 0.389  | 0.476  | 0.999  | 1.089  | 1.320 | 1.001 | 0.959 | 1.126 | 0.440 |
| 1995.00     | 0.002     |         | 0.268  | 0.611  | 0.709  | 1.037  | 1.315 | 0.929 | 0.906 | 1.098 | 0.142 |
| 1996.00     | 0.000     |         |        | 0.573  | 0.691  | 0.860  | 0.824 | 0.696 | 0.727 | 0.822 | 0.082 |
| 1997.00     | 0.000     | 0.087   | 0.158  | 0.269  | 0.659  | 0.550  | 0.709 | 0.967 | 0.407 | 0.608 | 0.056 |
| 1998.00     | 0.000     | 0.354   |        | 0.403  | 0.627  | 1.787  | 2.934 | 2.558 | 2.597 | 1.990 | 0.031 |
| 1999.00     | 0.002     |         |        | 0.513  | 0.844  | 0.982  | 1.003 | 1.082 | 1.657 | 0.988 | 0.001 |
| 2000.00     | 0.001     | 0.338   | 0.306  | 0.614  | 1.138  | 1.358  | 2.328 | 2.468 | 3.009 | 1.646 | 0.003 |
| 2001.00     | 0.000     | 0.150   | 0.574  | 0.402  | 0.853  | 1.097  | 2.203 | 3.121 | 2.321 | 1.451 | 0.001 |
| 2002.00     | 0.007     | 0.345   | 0.308  | 0.941  | 1.524  | 1.409  | 3.110 | 3.973 | 1.919 | 1.919 | 0.001 |
| 2003.00     | 0.000     | 0.330   | 0.827  | 0.713  | 1.997  | 1.448  | 2.898 | 2.251 | 2.811 | 0.000 | 0.000 |
| 2004.00     | 0.004     | 0.272   | 0.417  | 0.933  | 2.012  | 1.417  | 3.160 | 4.071 | 1.983 | 1.832 | 0.000 |
| 2005.00     | 0.000     | 0.114   | 0.228  | 0.399  | 0.512  | 0.569  | 0.569 | 0.569 | 0.569 | 0.569 | 0.000 |
|             |           |         |        |        |        |        |       |       |       |       |       |

LAMBDA 1.00000Eý2 RSS 1.85678E1 NPHI 1.85678E1

Parameters 8.51719E0

LAMBDA 1.00000Eý3 RSS 1.62243E1 NPHI 1.62243E1

Parameters 7.74421E0

LAMBDA 1.00000Eý4 RSS 1.59787E1 NPHI 1.59787E1

Parameters 7.46868E0

LAMBDA 1.00000Eý5 RSS 1.59550E1 NPHI 1.59550E1 Parameters 7.38005E0 LAMBDA 1.00000Eý5 RSS 1.59529E1 NPHI 1.59529E1 Parameters 7.35316E0 LAMBDA 1.00000Eý5 RSS 1.59527E1 NPHI 1.59527E1 Parameters 7.34517E0 LAMBDA 1.00000Eý5 RSS 1.59527E1 NPHI 1.59527E1 Parameters 7.34281E0 RELATIVE CHANGE IN RESIDUAL SUM OF SQUARES LESS THAN 0.00001 LAMBDA 1.00000Eý2 RSS 1.59527E1 NPHI 1.59527E1 Parameters 7.34281E0 1.75100E0 2.78829E0 2.88127E0 3.84886E0 3.89348E0 LAMBDA 1.00000Eý3 RSS 1.59527E1 NPHI 1.59527E1 Parameters 3.84895E0 3.89358E0 7.34212E0 1.75110E0 2.78838E0 2.88136E0 RELATIVE CHANGE IN RESIDUAL SUM OF SQUARES LESS THAN 0.00001 Estimated VPA (biased)

| Populatio | on Number | rs      |         |         |         |        |        |        |        |       |       |
|-----------|-----------|---------|---------|---------|---------|--------|--------|--------|--------|-------|-------|
|           | 1         | 2       | 3       | 4       | 5       | 6      | 7      | 8      | 9      | 10    | 11+   |
| 1965.00   | 3503534   | 3848688 | 995990  | 1312007 | 348049  | 92556  | 44658  | 4104   | 1354   | 406   | 500   |
| 1966.00   | 2737874   | 2624572 | 2177169 | 784001  | 863223  | 239988 | 66231  | 35035  | 2855   | 1060  | 707   |
| 1967.00   | 6078739   | 2102325 | 1329624 | 1378701 | 575717  | 418512 | 155171 | 41661  | 21740  | 836   | 1253  |
| 1968.00   | 1286168   | 4325977 | 1170158 | 950142  | 889042  | 372334 | 200109 | 75150  | 30056  | 17430 | 1311  |
| 1969.00   | 1754254   | 904620  | 1415817 | 755635  | 702962  | 467578 | 239085 | 82892  | 32938  | 10845 | 9244  |
| 1970.00   | 2304087   | 1338027 | 480252  | 682955  | 499558  | 429512 | 281595 | 139599 | 47575  | 21258 | 13377 |
| 1971.00   | 7460417   | 1256574 | 579796  | 324285  | 303152  | 228973 | 243661 | 130382 | 77266  | 19947 | 19640 |
| 1972.00   | 1138007   | 6028985 | 667899  | 309749  | 169889  | 146502 | 119687 | 115682 | 61966  | 30575 | 20551 |
| 1973.00   | 2336523   | 931722  | 4350854 | 481941  | 121063  | 70132  | 52761  | 54102  | 51165  | 27434 | 19153 |
| 1974.00   | 1625829   | 1912063 | 612115  | 2859195 | 277069  | 63139  | 30305  | 23481  | 26162  | 20577 | 15921 |
| 1975.00   | 247148    | 1314489 | 880008  | 416859  | 1619372 | 165491 | 34561  | 15639  | 13330  | 10013 | 15485 |
| 1976.00   | 721620    | 199458  | 790742  | 505119  | 229479  | 864256 | 76167  | 17278  | 8846   | 6633  | 11863 |
| 1977.00   | 4140081   | 590760  | 113384  | 461878  | 275572  | 126138 | 466414 | 43093  | 9149   | 3712  | 10203 |
| 1978.00   | 1346539   | 3388555 | 345406  | 64483   | 183136  | 119041 | 57492  | 223170 | 22748  | 4650  | 6640  |
| 1979.00   | 449147    | 1070508 | 2428553 | 245946  | 41184   | 41880  | 36645  | 19392  | 85497  | 8737  | 5577  |
| 1980.00   | 1572597   | 367422  | 710839  | 1762596 | 152252  | 28826  | 13695  | 13722  | 5372   | 33069 | 5530  |
| 1981.00   | 1669558   | 1285420 | 289532  | 509412  | 1017308 | 99518  | 19663  | 7007   | 5380   | 1742  | 19616 |
| 1982.00   | 2302838   | 1366918 | 959467  | 191249  | 324646  | 429491 | 51910  | 13919  | 3261   | 2687  | 15067 |
| 1983.00   | 4078526   | 1882162 | 1027010 | 649785  | 136177  | 177675 | 163382 | 29368  | 9523   | 1459  | 12505 |
| 1984.00   | 5027282   | 3334258 | 1368174 | 705445  | 313499  | 89457  | 91079  | 53687  | 14768  | 6242  | 9665  |
| 1985.00   | 1831381   | 4115990 | 2650014 | 900962  | 376337  | 126231 | 52832  | 55107  | 18746  | 3661  | 3339  |
| 1986.00   | 1059694   | 1491259 | 3174295 | 1865457 | 466203  | 175953 | 65334  | 30614  | 28818  | 8199  | 4231  |
| 1987.00   | 1397308   | 867547  | 1107935 | 2350078 | 1263651 | 330385 | 115618 | 43794  | 21173  | 20942 | 8641  |
| 1968.00   | 1401917   | 1141942 | 635504  | 793142  | 1449860 | 816306 | 229118 | 77122  | 29291  | 14308 | 20824 |
| 1989.00   | 1744614   | 1147656 | 801233  | 418412  | 474051  | 797404 | 456413 | 149310 | 44098  | 20211 | 22791 |
| 1990.00   | 1185719   | 1428362 | 847830  | 553220  | 286868  | 316593 | 500847 | 304643 | 105751 | 28662 | 29020 |

| 1991.00    | 579910    | 970785  | 1008567 | 576914 | 299026 | 154203 | 168557 | 225426 | 3 4 4 0 6 6 |       |       |
|------------|-----------|---------|---------|--------|--------|--------|--------|--------|-------------|-------|-------|
| 1992.00    | 824078    | 474790  | 707394  | 664216 | 307618 | 165457 | 89111  | 229416 | 144866      | 58343 | 31602 |
| 1993.00    | 1669807   | 674690  | 237693  | 459804 | 287340 | 138696 |        | 92791  | 115487      | 77777 | 45143 |
| 1994.00    |           | 1366972 | 483523  | 155220 | 202812 | 118503 | 68056  | 42113  | 44305       | 41843 | 51315 |
| 1995.00    | 1031471   |         | 1025476 | 268195 | 78955  |        | 53150  | 25557  | 15331       | 16747 | 47773 |
| 1996.00    | 913347    | 842843  | 485628  | 641941 |        | 61164  | 32668  | 11627  | 7693        | 4810  | 29629 |
|            | 1190195   | 747786  | 656218  |        | 119202 | 31801  | 17745  | 7177   | 3759        | 2545  | 22358 |
| 1998.00    | 619435    | 974127  | 561216  | 363580 | 296445 | 48890  | 11017  | 6373   | 2929        | 1487  | 17773 |
|            | 1700922   |         |         | 458527 | 227441 | 125595 | 23094  | 4439   | 1984        | 1596  | 14426 |
| 2000.00    |           | 507027  | 559657  | 403309 | 250907 | 99434  | 17222  | 1005   | 282         | 121   | 11630 |
|            | 1323824   |         | 313612  | 258409 | 197781 | 88303  | 30480  | 5174   | 279         | 44    | 9547  |
|            |           | 568953  | 811130  | 189061 | 114491 | 51891  | 18599  | 2432   | 359         | 11    | 7803  |
|            | 1851683   |         | 399712  | 373054 | 103486 | 39926  | 14185  | 1682   | 88          | 29    | 6387  |
|            | 1143490   |         | 614652  | 238657 | 118101 | 18379  | 7984   | 515    | 26          | 11    | 5230  |
| 2004.00    | 443442    | 935796  | 793604  | 198432 | 92909  | 11979  | 3478   | 357    | 42          | 1     | 4291  |
| 2005.00    |           | 360222  | 478777  | 339017 | 45154  | 6521   | 1598   | 75     | 3           | 3     | 3513  |
| 2006.00    | 1000000   | 818609  | 230118  | 238645 | 116465 | 12104  | 1544   | 378    | 18          | 1     | 2877  |
| Fishing M  | fortalit. |         |         |        |        |        |        |        |             |       |       |
| . Loning r | orcaricy  | 2       | 3       | 4      | 5      |        | _      |        |             |       |       |
| 1965.00    | 0.089     | 0.370   | 0.039   | 0.219  |        | 6      | 7      | 8      | 9           | 10    | 11+   |
| 1966.00    | 0.064     | 0.480   | 0.257   |        | 0.172  | 0.135  | 0.043  | 0.163  | 0.045       | 0.106 | 0.002 |
| 1967.00    | 0.140     | 0.386   | 0.136   | 0.109  | 0.524  | 0.236  | 0.264  | 0.277  | 1.028       | 0.252 | 0.002 |
| 1968.00    | 0.152     | 0.917   |         | 0.239  | 0.236  | 0.538  | 0.525  | 0.127  | 0.021       | 0.490 | 0.139 |
| 1969.00    | 0.071     | 0.433   | 0.237   | 0.101  | 0.443  | 0.243  | 0.681  | 0.625  | 0.819       | 0.440 | 2.943 |
| 1970.00    | 0.405     |         | 0.529   | 0.214  | 0.293  | 0.307  | 0.338  | 0.355  | 0.238       | 0.318 | 0.090 |
| 1971.00    |           | 0.636   | 0.193   | 0.612  | 0.580  | 0.367  | 0.570  | 0.392  | 0.669       | 0.450 | 0.248 |
| 1972.00    | 0.013     | 0.434   | 0.427   | 0.446  | 0.527  | 0.449  | 0.545  | 0.544  | 0.727       | 0.533 | 0.383 |
| 1973.00    | 0.000     | 0.126   | 0.126   | 0.739  | 0.685  | 0.821  | 0.594  | 0.616  | 0.615       | 0.678 | 0.960 |
|            | 0.000     | 0.220   | 0.220   | 0.354  | 0.451  | 0.639  | 0.610  | 0.527  | 0.711       | 0.622 | 1.402 |
| 1974.00    | 0.013     | 0.576   | 0.184   | 0.369  | 0.315  | 0.403  | 0.462  | 0.366  | 0.760       | 0.475 | 0.958 |
| 1975.00    | 0.014     | 0.308   | 0.355   | 0.397  | 0.428  | 0.576  | 0.493  | 0.370  | 0.498       | 0.545 | 0.579 |
| 1976.00    | 0.000     | 0.365   | 0.338   | 0.406  | 0.398  | 0.417  | 0.370  | 0.436  | 0.668       | 0.416 | 0.363 |
| 1977.00    | 0.000     | 0.337   | 0.364   | 0.725  | 0.639  | 0.586  | 0.537  | 0.439  | 0.477       | 0.539 | 0.540 |
| 1978.00    | 0.029     | 0.133   | 0.140   | 0.248  | 1.275  | 0.978  | 0.887  | 0.759  | 0.757       | 0.838 | 0.324 |
| 1979.00    | 0.001     | 0.209   | 0.121   | 0.280  | 0.157  | 0.918  | 0.782  | 1.084  | 0.750       | 0.830 | 0.639 |
| 1980.00    | 0.002     | 0.038   | 0.133   | 0.350  | 0.225  | 0.183  | 0.470  | 0.736  | 0.926       | 0.435 |       |
| 1981.00    | 0.000     | 0.092   | 0.215   | 0.251  | 0.662  | 0.451  | 0.145  | 0.565  | 0.494       |       | 0.776 |
| 1982.00    | 0.002     | 0.086   | 0.190   | 0.140  | 0.403  | 0.767  | 0.370  | 0.180  |             | 0.413 | 0.129 |
| 1983.00    | 0.001     | 0.119   | 0.176   | 0.529  | 0.220  | 0.468  | 0.913  | 0.487  | 0.604       | 0.708 | 0.077 |
| 1984.00    | 0.000     | 0.030   | 0.218   | 0.428  | 0.710  | 0.327  | 0.302  | 0.852  | 0.222       | 0.655 | 0.124 |
| 1985.00    | 0.005     | 0.060   | 0.151   | 0.459  | 0.560  | 0.459  | 0.346  |        | 1.195       | 0.483 | 3.753 |
| 1986.00    | 0.000     | 0.097   | 0.101   | 0.190  | 0.144  | 0.220  | 0.200  | 0.448  | 0.627       | 0.445 | 0.168 |
| 1987.00    | 0.002     | 0.111   | 0.134   | 0.283  | 0.237  | 0.166  | 0.205  | 0.169  | 0.119       | 0.201 | 0.095 |
| 1988.00    | 0.000     | 0.154   | 0.218   | 0.315  | 0.398  | 0.381  | 0.228  | 0.202  | 0.192       | 0.179 | 0.087 |
| 1989.00    | 0.000     | 0.103   | 0.170   | 0.177  | 0.204  | 0.265  | 0.204  | 0.359  | 0.171       | 0.344 | 0.163 |
| 1990.00    | 0.000     | 0.148   | 0.185   | 0.415  | 0.421  | 0.430  |        | 0.145  | 0.231       | 0.232 | 0.160 |
| 1991.00    | 0.000     | 0.117   | 0.218   | 0.429  | 0.392  |        | 0.581  | 0.543  | 0.395       | 0.517 | 0.300 |
| 1992.00    | 0.000     | 0.492   | 0.231   | 0.638  | 0.597  | 0.348  | 0.397  | 0.486  | 0.422       | 0.421 | 0.630 |
| 1993.00    | 0.000     | 0.133   | 0.226   | 0.619  | 0.686  | 0.688  | 0.550  | 0.539  | 0.815       | 0.663 | 0.691 |
| 1994.00    | 0.000     | 0.087   | 0.389   | 0.476  |        | 0.759  | 0.779  | 0.810  | 0.773       | 0.773 | 0.273 |
| 1995.00    | 0.002     | 0.191   | 0.268   | 0.611  | 0.999  | 1.089  | 1.320  | 1.001  | 0.959       | 1.126 | 0.440 |
| 1996.00    | 0.000     | 0.050   |         |        | 0.709  | 1.037  | 1.315  | 0.929  | 0.906       | 1.098 | 0.142 |
| 1997.00    | 0.000     | 0.087   | 0.089   | 0.573  | 0.691  | 0.860  | 0.824  | 0.696  | 0.727       | 0.822 | 0.082 |
| 1998.00    | 0.000     |         | 0.158   | 0.269  | 0.659  | 0.550  | 0.709  | 0.967  | 0.407       | 0.608 | 0.056 |
| 1999.00    | 0.002     | 0.354   | 0.130   | 0.403  | 0.627  | 1.787  | 2.934  | 2.558  | 2.597       | 1.990 | 0.031 |
| 2000.00    |           | 0.280   | 0.573   | 0.513  | 0.844  | 0.982  | 1.003  | 1.082  | 1.657       | 0.988 | 0.001 |
| 2000.00    | 0.001     | 0.339   | 0.306   | 0.614  | 1.138  | 1.358  | 2.328  | 2.468  | 3.009       | 1.646 | 0.003 |
|            | 0.000     | 0.153   | 0.577   | 0.403  | 0.853  | 1.097  | 2.203  | 3.121  | 2.321       | 1.451 | 0.001 |
| 2002.00    | 0.009     | 0.367   | 0.316   | 0.950  | 1.528  | 1.410  | 3.116  | 3.978  | 1.921       | 1.921 | 0.001 |
| 2003.00    | 0.000     | 0.438   | 0.931   | 0.743  | 2.088  | 1.465  | 2.908  | 2.306  | 2.878       | 0.000 | 0.000 |
| 2004.00    | 0.008     | 0.470   | 0.651   | 1.280  | 2.457  | 1.815  | 3.643  | 4.565  | 2.425       | 2.279 | 0.000 |
| 2005.00    | 0.000     | 0.248   | 0.496   | 0.868  | 1.117  | 1.241  | 1.241  | 1.241  | 1.241       | 1.241 | 0.000 |
|            |           |         |         |        |        |        |        |        |             | 21647 | 0.000 |

## APPROXIMATE STATISTICS ASSUMING LINEARITY NEAR SOLUTION

ORTHOGONALITY OFFSET..... 0.000813 MEAN SQUARE RESIDUALS ..... 0.550093

| Parameter N[2006 7] q ID#[3] q ID#[4] q ID#[5] q ID#[6] q ID#[6] q ID#[7] | Est.<br>1.54E3<br>5.76E0<br>1.63E1<br>1.78E1<br>4.69E1<br>4.91E1 | 7.61E2<br>1.66E0<br>4.69E0<br>5.15E0<br>1.35E1<br>1.42E1 | Rel. Err.<br>0.493<br>0.288<br>0.289<br>0.289<br>0.288 | Bias<br>1.65E2<br>2.22Eý1<br>6.38Eý1<br>7.11Eý1<br>1.88E0<br>1.96E0 | 0.107<br>0.038<br>0.039<br>0.040<br>0.040 |
|---|--|--|--|---|---|
|---|--|--|--|---|---|

| 1965                                      | 00 35035               | 1                       | 2                       | 3                             | 4       | 5              | 6      | -      |        |       |         |
|---|------------------------|-------------------------|-------------------------|-------------------------------|---------|----------------|--------|--------|--------|-------|---------|
| 1966.                                     | 00 33035.              | 34 384868               | 99599<br>2 217716       | 0 131200                      | 7 34804 |                |        | 7      |        |       | 0 1     |
| 1967.0                                    | 00 607973              | 9 212020                | 2 217716                | 9 78400                       |         |                |        |        | _      |       |         |
| 1968                                      | 00 129614              | 9 210232                | 5 132962<br>7 117015    | 4 137870                      | 1 57571 |                |        |        |        |       |         |
| 1969.0                                    | 00 175425              | 432397                  | 7 117015                | 8 95014;                      | 2 88904 |                |        |        |        |       |         |
| 1970.0                                    | 00 230408              | 7 127000                | 0 141581                |                               | 5 70296 |                |        |        |        |       | 0 131   |
| 1971.0                                    | 00 746041              | 7 133802                |                         |                               |         |                |        |        |        |       | 5 924   |
| 1972.0                                    | 0 113800               | 7 603060                |                         |                               | 303152  |                |        |        | _      |       | 8 1337  |
| 1973.0                                    | 0 233652               | 3 03170                 | 5 667899                |                               |         | 14650          |        |        |        |       |         |
| 1974.0                                    | 0 162582               | 93172                   | 2 4350854               | 481941                        | 121065  |                |        |        |        |       | 5 2055  |
| 1975.0                                    | 0 24714                | 9 191206                |                         | 2859195                       | 277069  | 63130          |        |        |        |       | 4 19153 |
| 1976.0                                    | 0 72182                | 8 131448                |                         |                               | 1619372 | 165491         |        |        |        |       | 7 15921 |
| 1977.0                                    | 0 414008               |                         |                         | 505119                        | 229479  |                |        |        |        |       | 3 15485 |
| 1978.0                                    | 0 134653               | 59076                   |                         |                               | 275572  |                |        |        |        |       |         |
| 1979.0                                    | 0 44014                | 338855                  | 5 345406<br>8 2428553   |                               | 183136  |                |        |        |        |       |         |
| 1980 0                                    | 0 157259               | 1070508                 | 3 2428553               | 245946                        | 41184   |                |        |        |        |       |         |
| 1981.0                                    | 0 15/259               | 367422                  | 710839                  | 1762596                       | 152252  | 29926          |        |        |        |       |         |
| 1982 0                                    | 0 1669558<br>0 2302838 | 1285420                 | 289532                  | 509412                        | 1017308 | 99518          |        |        |        |       | 5530    |
| 1983.0                                    | 0 407050               | 1366918                 | 959467                  |                               | 324646  |                |        |        | 2000   | 1742  |         |
| 1984 0                                    | 0 500700               | 1882162                 | 1027010                 | 649785                        | 136177  |                |        |        |        | 2687  |         |
| 1985 00                                   | 1631301                | 3334258                 | 1368174                 | 705445                        |         |                |        |        |        | 1459  |         |
| 1986 00                                   | 1051381                | 4115990                 | 2650014                 |                               |         |                |        |        |        | 6242  |         |
| 2200.00                                   | 1 1009644              | 1401250                 | 2124000                 |                               |         | 175953         | 52832  |        |        | 3661  |         |
|   |                        |                         | 1107935                 | 2350078                       | 1263651 | 330385         | 65334  | 30614  |        |       |         |
|   |                        |                         | 033304                  | 793142                        | 1449860 | 816306         | 115618 | 43794  | 21173  |       |         |
| 1990 00                                   | 1744614                | 1147656                 |                         | 418412                        | 474051  | 797404         | 229118 | 77122  | 29291  |       |         |
| 1991 00                                   | 1185719                | 1426362                 | 847830                  | 553220                        | 286868  | 316593         | 456413 | 149310 | 44098  | 20211 | 22791   |
| 1992 00                                   | 579910                 |                         | 1008567                 | 576914                        | 299026  | 154203         | 500847 | 304643 |        | 28662 | 29020   |
| 1992.00                                   | 824078                 | 474790                  | 707394                  | 664216                        | 307618  | 165457         | 168557 | 229416 | 144866 | 58343 | 31602   |
| 1993.00                                   | 1669807                | 674690                  | 237693                  | 459804                        | 287340  | 138696         | 89111  | 92791  | 115487 | 77777 | 45143   |
| 1994.00                                   | 877050                 | 1366972                 | 483523                  | 155220                        | 202812  | 118503         | 68056  | 42113  | 44305  | 41843 | 51315   |
| 1995.00                                   | 1031470                |                         | 1025476                 | 268195                        | 78955   | 61164          | 53150  | 25557  | 15331  | 16747 | 47773   |
| 1996.00                                   | 913346                 |                         | 485628                  | 641941                        | 119202  |                | 32668  | 11627  | 7693   | 4810  | 29629   |
| 1999.00                                   | 1190194                | 747785                  | 656218                  | 363580                        | 296445  | 31801<br>48890 | 17745  | 7177   | 3759   | 2545  | 22358   |
| 1990.00                                   | 619421                 | 974127                  | 561215                  | 458527                        | 227441  |                | 11017  | 6373   | 2929   | 1487  | 17773   |
| 2000 00                                   | 1700724                | 507015                  | 559656                  | 403309                        | 250907  | 125595         | 23094  | 4439   | 1984   | 1596  | 14426   |
| 2001.00                                   | 695211                 | 1390002                 | 313603                  | 258409                        | 197780  | 99434          | 17222  | 1005   | 282    | 121   | 11630   |
| 2002.00                                   | 1320249                | 568431                  | 810998                  | 189053                        | 114490  | 88303<br>51890 | 30480  | 5174   | 279    | 44    | 9547    |
| 2002.00                                   | 1827341                | 1080882                 | 399285                  | 372946                        | 103480  |                | 18599  | 2432   | 359    | 11    | 7803    |
| 2003.00                                   | 1109406                |                         | 612261                  | 238308                        | 118014  | 39925<br>18374 | 14185  | 1682   | 88     | 29    | 6387    |
| 2005 00                                   | 419699                 | 907890                  | 777340                  | 196503                        | 92625   | 11913          | 7983   | 515    | 26     | 11    | 5230    |
| 2006.00                                   | 1000000                | 340782                  | 456017                  | 325797                        | 43619   | 6314           | 3474   | 357    | 42     | 1     | 4291    |
| .000.00                                   | 1000000                | 818609                  | 214219                  | 220091                        | 105786  | 10874          | 1547   | 72     | 3      | 3     | 3513    |
| china M                                   | ortality               |                         |                         |                               |         | 100/4          | 1379   | 338    | 16     | 1     | 2877    |
| oning M                                   | 1                      |                         |                         |                               |         |                |        |        |        |       |         |
| 965.00                                    | 0.089                  | 0.370                   | 0.000                   | 4                             | 5       | 6              | 7      | 8      |        |       |         |
| 966.00                                    | 0.064                  | 0.480                   | 0.039                   | 0.219                         | 0.172   | 0.135          | 0.043  | 0.163  | 0 045  | 10    | 11+     |
| 967.00                                    | 0.140                  |                         | 0.257                   | 0.109                         | 0.524   | 0.236          | 0.264  | 0.277  | 0.045  | 0.106 | 0.002   |
| 968.00                                    | 0.152                  | 0.386                   | 0.136                   | 0.239                         | 0.236   | 0.538          | 0.525  | 0.127  | 1.028  | 0.252 | 0.002   |
| 969.00                                    | 0.071                  | 0.917                   | 0.237                   | 0.101                         | 0.443   | 0.243          | 0.681  |        | 0.021  | 0.490 | 0.139   |
| 970.00                                    | 0.405                  | 0.433                   | 0.529                   | 0.214                         | 0.293   | 0.307          | 0.338  | 0.625  | 0.819  | 0.440 | 2.943   |
| 971.00                                    | 0.013                  | 0.636                   | 0.193                   | 0.612                         | 0.580   | 0.367          | 0.570  | 0.392  | 0.238  | 0.318 | 0.090   |
| 972.00                                    | 0.000                  | 0.434                   | 0.427                   | 0.446                         | 0.527   | 0.449          | 0.545  |        | 0.669  | 0.450 | 0.248   |
| 973.00                                    | 0.000                  | 0.126                   | 0.126                   | 0.739                         | 0.685   | 0.821          | 0.594  | 0.544  | 0.727  | 0.533 | 0.383   |
| 974.00                                    |                        | 0.220                   | 0.220                   | 0.354                         | 0.451   | 0.639          | 0.610  | 0.616  | 0.615  | 0.678 | 0.960   |
| 975.00                                    | 0.013                  | 0.576                   | 0.184                   | 0.369                         | 0.315   | 0.403          | 0.462  | 0.527  | 0.711  | 0.622 | 1.402   |
| 976.00                                    |                        | 0.308                   | 0.355                   | 0.397                         | 0.428   | 0.576          |        | 0.366  | 0.760  | 0.475 | 0.958   |
| 977.00                                    | 0.000                  | 0.365                   | 0.338                   | 0.406                         | 0.398   | 0.417          | 0.493  | 0.370  | 0.498  | 0.545 | 0.579   |
| 978.00                                    | 0.000                  | 0.337                   | 0.364                   | 6 700                         |         | 0.586          | 0.370  | 0.436  | 0.668  | 0.416 | 0.383   |
|   | 0.029                  | 0.133                   | 0.140                   |                               | 1.275   | 0.978          | 0.537  | 0.439  | 0.477  | 0.539 | 0.540   |
| 79.00                                     | 0.001                  | 0.209                   |                         |                               | 0.157   |                | 0.887  | 0.759  | 0.757  | 0.838 | 0.324   |
| 80.00                                     | 0.002                  | 0.038                   |                         |                               |         | 0.918          | 0.782  | 1.084  | 0.750  | 0.830 | 0.639   |
| 81.00                                     | 0.000                  | 0.092                   |                         |                               | 4 44    |                | 0.470  | 0.736  | 0.926  | 0.435 | 0.776   |
| 82.00                                     | 0.002                  | 0.086                   |                         |                               |         | 0.451          | 0.145  | 0.565  | 0.494  | 0.413 | 0.129   |
| 83.00                                     | 0.001                  | 0.119                   |                         |                               |         |                | 0.370  | 0.180  | 0.604  | 4     | 0.077   |
| 84 00                                     | 0.000                  | 0.030                   |                         |                               |         |                |        | 0.487  | 0.222  |       | 0.124   |
|   | 0.005                  | 0.060                   |                         |                               |         |                | 0.302  |        |        |       |         |
| 85.00                                     | 0.000                  |                         |                         |                               |         |                | 0.346  |        |        |       | 3.753   |
| 85.00<br>86.00                            |                        |                         |                         |                               |         |                |        |        |        |       | 0.168   |
| 85.00<br>86.00<br>87.00                   | 0.002                  |                         |                         | 11 - 11 11 1 1                | 0.237   |                |        |        |        |       | 0.095   |
| 85.00<br>86.00<br>87.00<br>88.00          |                        |                         |                         |                               |         |                | 0.205  | 0.402  | 0.190  | 0 170 | 0 00-   |
| 85.00<br>86.00<br>87.00<br>88.00<br>89.00 | 0.002                  | 0.154                   | 0.218                   | 0.315 (                       | 0.398   | 0.381          |        |        |        |       | 0.087   |
| 85.00<br>86.00<br>87.00<br>88.00          | 0.000                  | 0.154                   | 0.218                   | 0.315 (                       | 0.398   | 0.381          | 0.228  | 0.359  | 0.171  | 0.344 | 0.163   |
| 85.00<br>86.00<br>87.00<br>88.00<br>89.00 | 0.000                  | 0.154<br>0.103<br>0.148 | 0.218<br>0.170<br>0.185 | 0.315 (<br>0.177 (<br>0.415 ( | 0.398   | 0.381          | 0.228  | 0.359  | 0.171  | 0.344 |         |

0.815 0.663 0.773 0.773 0.959 1.126 0.906 1.098 0.727 0.822 0.407 0.608 2.597 1.990

2.597 1.990 1.657 0.988 3.009 1.646 2.321 1.451 1.921 1.921 2.882 0.000 2.454 2.309 1.321 1.321

0.539

1.001

2.468 3.121 3.978 2.309

4.596

0.929 0.906 0.696 0.727 0.967 0.407 2.558 2.597 1.082 1.657 0.691

0.440

0.142 0.082 0.056 0.031

0.001

0.003 0.001 0.001 0.000 0.000

0.000

| 1993.00 (<br>1994.00 (<br>1995.00 ( | 0.000<br>0.000<br>0.000<br>0.002 | 0.492<br>0.133<br>0.087<br>0.191 | 0.231<br>0.226<br>0.389<br>0.268 | 0.638<br>0.619<br>0.476<br>0.611 | 0.597<br>0.686<br>0.999<br>0.709 | 0.688<br>0.759<br>1.089<br>1.037 | 0.550<br>0.779<br>1.320<br>1.315 |
|-------------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
| 1997.00                             | 0.000                            | 0.050                            | 0.089                            | 0.573                            | 0.691                            | 0.860                            | 0.824                            |
|                                     | 0.000                            | 0.354                            | 0.130                            | 0.403                            | 0.627                            | 1.787                            | 2.934                            |
|                                     | 0.002                            | 0.280                            | 0.573                            | 0.513                            | 0.844                            | 0.982                            | 1.003                            |
|                                     | 0.001                            | 0.339                            | 0.306                            | 0.614                            | 1.138                            | 1.358                            | 2.328                            |
|                                     | 0.000                            | 0.153                            | 0.577                            | 0.403                            | 0.853                            | 1.097                            | 2.203                            |
|                                     | 0.009                            | 0.368                            | 0.316                            | 0.951                            | 1.528                            | 1.410                            | 3.117                            |
|                                     | 0.008                            | 0.489                            | 0.670                            | 1.305                            | 2.486                            | 1.841                            | 3.674                            |
|                                     | 0.000                            | 0.264                            | 0.528                            | 0.925                            | 1.189                            | 1.321                            | 1.321                            |
| Acoustic Ove                        |                                  |                                  |                                  |                                  |                                  |                                  |                                  |
| Ln calibrat:                        | ion cor                          | stant :                          | 1                                | .75110                           |                                  |                                  |                                  |
| Year                                |                                  | erved                            | Predic                           |                                  | Residua                          |                                  | Ln Pop.                          |
| 1999.65                             |                                  | 05395                            | 14.19                            |                                  | -1.1414                          |                                  | 12.44430                         |
| 2000.65                             |                                  | 44058                            | 13.68                            |                                  | -0.2436                          |                                  | 11.93317                         |
| 2001.65                             |                                  | 03457                            | 13.50                            |                                  | -0.4746                          |                                  | 11.75811                         |
| 2002.65                             |                                  | 47735                            | 13.83                            |                                  | 0.6444                           | 40                               | 12.08186                         |
| 2003.65                             |                                  | 73914                            | 13.52                            | 2066                             | 0.2184                           | 18                               | 11.76956                         |
| 2004.65                             |                                  | 99252                            | 12.98                            | 8703                             | 1.0054                           | 19                               | 11.23593                         |
| 2005.65                             | 13.                              | 78184                            | 13.75                            | 9030                             | -0.0084                          | 47                               | 12.03921                         |
| A                                   | verage                           | squared                          | residual                         | 1 :                              | 0.437                            | 38                               |                                  |
| Acoustic Ove<br>Age: 5              | erall                            |                                  |                                  |                                  |                                  |                                  |                                  |
| Ln calibrat:                        | ion cor                          | stant:                           | 2.                               | .78838                           |                                  |                                  |                                  |
| Year                                |                                  | served                           | Predic                           |                                  | Residua                          |                                  | Ln Pop.                          |
| 1999.65                             | 14.                              | 04638                            | 14.5                             | 4242                             | -0.4960                          | 04                               | 11.75404                         |
| 2000.65                             | 13.                              | 74356                            | 14.1                             |                                  | -0.3700                          | 0.3                              | 11.32520                         |
| 2001.65                             |                                  | 05480                            | 13.75                            |                                  | -0.697                           |                                  | 10.96349                         |
| 2002.65                             |                                  | 29224                            | 13.2                             |                                  | 0.080                            |                                  | 10.42383                         |
| 2003.65                             |                                  | 58783                            | 12.9                             |                                  | 0.607                            |                                  | 10.19184                         |
| 2004.65                             |                                  | 54056                            | 12.50                            |                                  | 1.039                            |                                  | 9.71255                          |
| 2005.65                             | 12.                              | 48637                            | 12.6                             | 5033                             | -0.1639                          | 97                               | 9.86195                          |
| A                                   | verage                           | squared                          | residua                          | 1 :                              | 0.3360                           | 0.3                              |                                  |
| Acoustic Ove                        | erall                            |                                  |                                  |                                  |                                  |                                  |                                  |
| Ln calibrat                         | ion com                          | stant:                           | 2                                | .88136                           |                                  |                                  |                                  |
| Year                                |                                  | served                           | Fredi                            |                                  | Residua                          |                                  | Ln Pop.                          |
| 1999.65                             |                                  | 46367                            | 13 6                             |                                  | -0.126                           |                                  | 10.73867                         |
| 2000.65                             |                                  | .49367<br>.11595                 | 13.6                             |                                  | -0.141                           |                                  | 10.73867                         |
| 2001.65                             |                                  | 54234                            | 12.8                             |                                  | -0.352                           |                                  | 10.01388                         |
| 2002.65                             |                                  | 29205                            | 12.4                             |                                  | -0.137                           |                                  | 9.54853                          |
| 2003.65                             |                                  | 56020                            | 11.6                             |                                  | -0.057                           |                                  | 8.73681                          |
| 2004.65                             |                                  | 67337                            | 10.9                             |                                  | 0.710                            |                                  | 8.08132                          |
| 2005.65                             |                                  | 83360                            | 10.7                             |                                  | 0.106                            |                                  | 7.84623                          |
| A                                   | verage                           | squared                          | residua                          | 1 :                              | 0.099                            | 88                               |                                  |
| Acoustic Ov                         | erall                            |                                  |                                  |                                  |                                  |                                  |                                  |
| Age: 7                              |                                  |                                  |                                  |                                  |                                  |                                  |                                  |
| Ln calibrat                         | ion com                          | istant :                         | 3                                | .84895                           |                                  |                                  |                                  |
| Year                                |                                  | served                           | Predi                            |                                  | Residua                          |                                  | Ln Pop.                          |
| 1999.65                             |                                  | 06117                            | 12.8                             |                                  | -0.760                           |                                  | 8.97229                          |
| 2000.65                             |                                  | 27337                            | 12.5                             |                                  | -0.256                           |                                  | 8.68139                          |
| 2001.65                             |                                  | 87029                            | 12.1                             |                                  | -0.247                           | 52                               | 8.26886                          |
| 2002.65                             |                                  | 70640                            | 11.2                             |                                  | 0.453                            |                                  | 7.40437                          |
| 2003.65                             | 10                               | 99454                            | 10.8                             | 1410                             | 0.180                            | 45                               | 6.96515                          |
| 2004.65                             | 10                               | 76452                            | 9.5                              | 0532                             | 1.259                            | 19                               | 5.65637                          |

Appendix B. VPA formulation and model output for overall acoustic index (ages 4-8).

| 2005.65   | 9  | .66059   | 10.2   | 88€2                             | -0.628   | 03                         | 6.43967   |              |              |               |              |
|---|--|--|--|----------------------------------|--|----------------------------|---|--------------|--------------|---------------|--------------|
|   | Average  | squared  | residua  | 1 :                              | 0.417  | 55                         |   |              |              |               |              |
| Acoustic<br>Age : 8   |  |  |  |                                  |  |                            |   |              |              |               |              |
| Ln calibr   | ation co   | nstant :   | 3  | .89358                           |  |                            |   |              |              |               |              |
| Year  |  | served   | Predi  |                                  | Residu   |                            | Ln Pop.   |              |              |               |              |
| 1999.65<br>2000.65<br>2001.65<br>2002.65<br>2003.65<br>2004.65<br>2005.65 | 8 10<br>10<br>10<br>9<br>7<br>8                                      | .66122<br>.52601<br>.14393<br>.76203<br>.64053<br>.09396 | 9.9<br>10.7<br>9.5<br>8.6<br>8.5<br>6.6        | 7329                             | -1.3120<br>-0.1840<br>0.6120<br>1.156<br>-0.8680<br>1.4190 | 07<br>81<br>65<br>35<br>00 | 6.07971<br>6.81724<br>5.63769<br>4.71210<br>4.61495<br>2.78040<br>3.37495 |              |              |               |              |
|   | Average  | squared  | residua  | 1 :                              | 0.988  | 12                         |   |              |              |               |              |
| ý0.23 1<br>ý0.24 0<br>ý0.24 0<br>ý0.23 0                                  | 0.23 ý0.2<br>.00 0.0<br>0.06 1.0<br>0.06 0.0<br>0.05 0.0<br>0.06 0.0 | 6 0.06<br>0 0.06<br>6 1.00<br>6 0.06<br>6 0.06           | 0.05 0<br>0.06 0<br>0.06 0<br>1.00 0<br>0.06 1 | .06<br>.06<br>.06                |  |                            |   |              |              |               |              |
| Acoustic<br>Acoustic<br>Acoustic<br>Acoustic<br>Autocorre                 | Overall<br>Overall<br>Overall  | 5 Abunda<br>6 Abunda<br>7 Abunda<br>8 Abunda             | nce Prop<br>nce Prop<br>nce Prop               | ortional<br>ortional<br>ortional |  |                            |   |              |              |               |              |
| Projection Projected  | i Populat  | ion Numb   | ers  |                                  |  |                            |   |              |              |               |              |
|   |  |  | 214219   | 220091                           | 5<br>105786<br>156654                                      |                            | 7<br>1379<br>7289   | 338<br>925   | 16<br>226    | 10<br>1<br>11 | 2877<br>1929 |
| Fishing M   |  | 2  | 3  | 4                                | 5  | 6                          | 7   | 8            | 9            | 10            | 11+          |
| 2006.00   | 0.000  |  |  | 0.140                            | 0.180  | 0.200                      | 0.200   | 0.200        | 0.200        | 0.200         | 0.200        |
| М   |  |  |  |                                  |  |                            |   |              |              |               |              |
| 200€.00   | 0.20   | 0.20   | 0.20   | 0.20                             | 0.20   | 0.20                       | 0.20  | 0.20         | 0.20         | 0.20          | 0.20         |
| PR<br>2006.00   | 0.00   | 20.20  | 3<br>0.40                                      | 0.70                             | 5.90   | 1.00                       | 7   | 8            | 9.00         | 10            | 11           |
| _   |  |  |  |                                  |  |                            |   |              |              |               |              |
| 2006.00<br>2007.00  | 0.02<br>0.02   | 0.02<br>0.02   | 0.05<br>0.05                                   | 0.11<br>0.11                     | 0.16<br>0.16   | 6.21<br>0.21               | 7<br>0.25<br>0.25   | 0.28<br>0.28 | 0.31<br>0.31 | 0.35<br>0.35  | 0.35<br>0.35 |
| Projected   | i Populat  | ion Biom   | nass   |                                  |  |                            |   |              |              |               |              |
| 1+ 2  | 24 3   | + 4  | +  |                                  |  |                            |   |              |              |               |              |
| 2006.00<br>91734<br>2007.00<br>130982                                     | 19046  | 6843 4<br>15847  | 34645  |                                  |  | 2286<br>15209              | 340<br>1796   |              |              | 4             |              |
| Projected   | d Catch N  | lumbers  |  |                                  |  |                            |   |              |              |               |              |
|   | 1  | -2   | 3  | 4                                | 5  | 6                          | 7<br>227  | 8            |              | 10            | 11<br>474    |

Appendix B. VPA formulation and model output for overall acoustic index (ages 4-8).

|          |  | 2   |  | г,  | 6  | 7   | 8  | 45  | 10  | 11   |
|----------|--|---|--|---|--|---|--|---|---|--|
| _        |  |   |  |   |  | 0.26  | 0.31   | 0.30  | 0.36  | 0.36   |
| 0.02     | 0.03   | 0.00  | 0.14   | 0.22  |  |   |  |   |   |  |
| Catch Bi | omass  |   |  |   | 6  | 7   | 8  | 4   | 10  | 11   |
| 1        | 2  |   | 4  | 5   | 0  | ,   |  |   |   |  |
| 0        | 1011   | 1244  | 3680   | 3033  | 417  | 60  | 17   | 1   | 0   | 173  |
|          |  |   |  |   |  |   |  |   |   |  |
| Analytic | al risk  | analysis  | of proj  | ection r  | esults   |   |  |   |   |  |
|          |  |   |  |   |  | 7   | 8  | 9   | 10  | 11   |
| 1        |  |   |  |   |  |   |  |   | 0.20  | 0.20   |
| 0.20     | 0.20   | 0.20  | 0.20   | 0.20  | 0.20   | 0.20  |  |   |   |  |
|          |  |   |  |   |  |   |  | 0   | 10  | 11   |
| 1        | 2  | 3   | 4  |   |  |   |  |   |   | 1.00   |
| 0.00     | 0.20   | 0.40  | 0.70   | 0.90  | 1.00   | 1.00  | 1.00   | 1.00  | 2.00  |  |
|          |  |   |  |   |  |   |  | 0   | 20  | 11   |
| 1        | 2  | 3   | 4  | 5   |  |   |  |   |   | 0.35   |
|          | 0.02   | 0.05  | 0.11   | 0.16  |  |   |  |   |   | 0.35   |
| 0.02     | 0.02   | 0.05  | 0.11   | 0.16  | 0.21   | 0.25  | 0.29   | 0.34  | 0.00  |  |
|          |  |   |  | 6   |  | 7   | 8  | 9   | 10  | 11   |
| 1        |  |   |  |   |  |   |  | 0.32  | 0.36  | 0.36   |
| 0.02     | 0.03   | 0.08  | 0.14   | 0.15  | 0.20   |   |  |   |   |  |
|          |  |   |  | -   |  | 7   | B  | 9   | 10  | 11   |
| 1        | 2  |   | 0.90   | 1.00  | 1.00   | 1.00  | 1.00   | 1.00  | 1.00  | 1.00   |
|          |  |   |  |   |  |   |  |   |   |  |
| 0.00     | 0.00   | 0.50  | 0.90   | 1.00  | 1.00   | 1.00  | 1.00   | 1.00  | 1.00  | 1.00   |
|          | 1<br>0<br>0<br>36 86<br>Analytic<br>0.20<br>1<br>0.00<br>1<br>0.02<br>0.02 | 0.02 0.03 Catch Biomass 1 2 3+ 4+ 0 1011 36 8625 73 Analytical risk 0.20 0.20 1 2 0.02 0.02 0.02 0.02 1 2 0.02 0.02 0.02 0.02 | 0.02 0.03 0.08  Catch Biomass  1 2 3 3+ 4+ 0 1011 1244  36 8625 7381  Analytical risk analysis  1 2 3 0.20 0.20 0.20  1 2 3 0.00 0.20 0.40  1 2 3 0.02 0.02 0.05  0.02 0.02 0.05  1 2 3 0.02 0.02 0.05  0.02 0.03 0.08 | 0.02 0.03 0.08 0.14  Catch Biomass  1 2 3 4 0 1011 1244 3680  36 8625 7381  Analytical risk analysis of proj  0.20 0.20 0.20 0.20  1 2 3 4 0.00 0.20 0.40 0.70  1 2 3 4 0.02 0.02 0.40 0.70  1 2 3 4 0.02 0.02 0.05 0.11 0.02 0.02 0.05 0.11  1 2 3 4 0.02 0.02 0.05 0.11 | 0.02 0.03 0.08 0.14 0.19  Catch Biomass  1 2 3 4 5  0 1011 1244 3680 3033  Analytical risk analysis of projection r  0.20 0.20 0.20 0.20 0.20 0.20  1 2 3 4 5  0.00 0.20 0.40 0.70 0.90  1 2 3 4 5  0.00 0.20 0.40 0.70 0.90  1 2 3 4 5  0.00 0.20 0.40 0.70 0.90  1 2 3 4 5  0.00 0.20 0.40 0.70 0.90 | 0.02 0.03 0.08 0.14 0.19 0.23  Catch Biomass  1 2 3 4 5 6 0 1011 1244 3680 3033 417  Analytical risk analysis of projection results  0.20 0.20 0.20 0.20 0.20 0.20 0.20  1 2 3 4 5 6 0.20 0.20 0.20 0.20 0.20 0.20  1 2 3 4 5 6 0.00 0.20 0.40 0.70 0.90 1.00  1 2 3 4 5 6 0.02 0.02 0.05 0.11 0.16 0.21 0.02 0.02 0.05 0.11 0.16 0.21  1 2 3 4 5 6 0.02 0.02 0.05 0.11 0.16 0.21 | 1 2 3 4 5 6 7 381  Analytical risk analysis of projection results  1 2 3 4 5 6 7 381  Analytical risk analysis of projection results  1 2 3 4 5 6 7 7 80 7 80 7 80 7 80 7 80 7 80 7 80 | 1 2 3 4 5 6 7 8 17 18 18 18 18 18 18 18 18 18 18 18 18 18 | 1 2 3 4 5 6 7 8 9  0.20 0.20 0.20 0.20 0.20 0.20 0.20 0.2 | 1 2 3 4 5 6 7 8 9 10  1 2 3 4 5 6 7 8 9 10  3+ 4+ 0 1011 1244 3680 3033 417 60 17 1 0  Analytical risk analysis of projection results  1 2 3 4 5 6 7 8 9 10  3- 8625 7381  Analytical risk analysis of projection results  1 2 3 4 5 6 7 8 9 10  0.20 0.20 0.20 0.20 0.20 0.20 0.20 0. |

Appendix B. VPA formulation and model output for overall acoustic index (ages 4-8).

|       | Inverse | Exploitation  | Rate (Re | ference =  | 5.39 1 |
|-------|---------|---------------|----------|------------|--------|
| Ouota |         | Std. Err.     |          | Adj. Mean  | Prob   |
| 5000  | 12,433  | 5.060         | 1.088    | 11.345     | 0.120  |
| 10000 | 6.303   | 2.565         | 0.551    | 5.752      | 0.444  |
| 15000 | 4.264   | 1.735         | 0.373    | 3.891      | 0.806  |
| 20000 | 3.247   | 1.322         | 0.284    | 2.963      | 0.967  |
| 25000 | 2.640   | 1.074         | 0.231    | 2.409      | 0.997  |
| 30000 | 2,238   | 0.911         | 0.196    | 2.042      | 1.000  |
| 35000 | 1.953   | 0.795         | 0.171    | 1.782      | 1.000  |
| 40000 | 1.742   | 0.709         | 0.152    | 1.590      | 1.000  |
| 45000 | 1.581   | 0.643         | 0.138    | 1.443      | 1.000  |
| 50000 | 1.454   | 0.592         | 0.127    | 1.327      | 1.000  |
| 55000 | 1.354   | 0.551         | 0.118    | 1.235      | 1.000  |
|       | ê B     | iomass Change | Refer    | ence = 0 ) |        |
| Quota |         | Std. Err.     |          | Adj. Mean  | Prob   |
| 5000  | 65      | 11            | 2        | 63         | 0.000  |
| 10000 | 56      | 7             | 1        | 55         | 0.000  |
| 15000 | 46      | 4             | 1        | 46         | 0.000  |
| 20000 | 37      | 0             | 0        | 37         | 0.000  |
| 25000 | 28      | 3             | 91       | 29         | 0.000  |
| 30000 | 19      | 6             | ý1       | 20         | 0.001  |
| 35000 | 10      | 10            | ý2       | 11         | 0.120  |
| 40000 | 1       | 13            | ý2       | 3          | 0.412  |
| 45000 | ý8      | 16            | ý3       | ý6         | 0.636  |
| 50000 | ý17     | 19            | y3       | ý14        | 0.769  |
| 55000 | ý26     | 22            | ý3       | ý23        | 0.846  |
|       | В       | iomass (Refer |          |            |        |
| Quota | Mean    | Std. Err.     |          | Adj. Mean  | Prob   |
| 5000  | 87433   | 27129         | 5142     | 82291      | 0.743  |
| 10000 | 82497   | 27122         | 5144     | 77353      | 0.798  |
| 15000 | 77577   | 27109         | 5147     | 72430      | 0.845  |
| 20000 | 72678   | 27090         | 5153     | 67525      | 0.885  |
| 25000 | 67800   |               | 5163     | €2637      | 0.916  |
| 30000 | 62946   |               | 5178     | 57769      | 0.941  |
| 35000 | 58120   | 26969         | 5201     | 52919      | 0.960  |
| 40000 | 53325   | 26898         | 5236     | 48089      | 0.973  |
| 45000 | 48566   |               | 5291     | 43275      | 0.983  |
| 50000 | 43849   |               | 5378     | 38471      | 0.989  |
| 55000 | 39181   | 26513         | 5518     | 33663      | 0.994  |

THURSDAY, APRIL 6, 2006 11:36:37.113 AM

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ADAPT W Ver. 3.0

Workspace size = 16000000

| Catch   | ,      | 2       | 3      | 4               | 5      | 6             | 7      | 8      | 9            | 10    | 11    |
|---------|--------|---------|--------|-----------------|--------|---------------|--------|--------|--------------|-------|-------|
| 1005 00 | 270270 | 1084719 | 34835  | 234383          | 49925  | 10592         | 1693   | 561    | 54           | 37    | 1     |
| 1965.00 | 154323 | 914093  | 448940 | 73382           | 321857 | 45916         | 13970  | 7722   | 1690         | 215   | 1     |
| 1966.00 | 722208 | 613970  | 153626 | 266454          | 110051 | 159203        | 57948  | 4497   | 409          | 296   | 148   |
| 1967.00 |        | 2389061 | 224956 | 83109           | 290285 | 73087         | 90617  | 31977  | 15441        | 5668  | 1175  |
| 1968.00 | 108875 | 290329  | 531812 | 132319          | 162439 | 112631        | 62506  | 22595  | 6345         | 2693  | 722   |
| 1969.00 | 699720 | 576896  | 76532  | 286278          | 201215 | 120280        | 111937 | 41257  | 21271        | 7039  | 2674  |
| 1970.00 |        | 404224  | 183896 | 106630          | 113566 | 75593         | 93620  | 50022  | 36618        | 7536  | 5695  |
| 1971.00 | 87570  |         | 71984  | 148516          | 77207  | 75384         | 49065  | 48700  | 26055        | 13792 | 11679 |
| 1972.00 | 0      | 649254  | 781061 | 130851          | 40128  | 30334         | 22046  | 20249  | 23871        | 11630 | 13386 |
| 1973.00 | 1018   | 167454  | 93606  | 803651          | 68276  | 19093         | 10232  | 6565   | 12786        | 7102  | 9031  |
| 1974.00 | 18411  | 766064  |        | 124599          | 514605 | 66302         | 12298  | 4409   | 4778         | 3847  | 6225  |
| 1975.00 | 3199   | 317641  | 239827 |                 | 68804  | 268839        | 21460  | 5571   | 3951         | 2059  | 3446  |
| 1976.00 | 240    | 55596   | 206535 | 153782          | 119234 | 51173         | 177247 | 13977  | 3170         | 1415  | 3894  |
| 1977.00 | 1170   | 153921  | 31572  | 218478<br>12906 | 122108 | 68410         | 31088  | 108975 | 11082        | 2425  | 1676  |
| 1978.00 | 35381  | 383611  | 40887  |                 |        |               | 18255  | 11836  | 41389        | 4527  | 2411  |
| 1979.00 | 342    | 183982  | 250393 | 54620           | 5430   | 23142<br>4373 | 4692   | 6560   | 2985         | 10641 | 2739  |
| 1980.00 | 2339   | 12503   | 80518  | 474091          | 27930  |               | 2418   | 2767   | 1917         | 538   | 2149  |
| 1981.00 | 0      | 103051  | 50883  | 102743          | 451482 | 32978         |        | 2080   | 1354         | 1250  | 1014  |
| 1982.00 | 3589   |         | 150764 | 22640           | 98206  | 211043        | 14627  |        |              | 642   | 1324  |
| 1983.00 | 5488   | 191682  | 150328 | 244007          | 24483  | 60678         | 89982  | 10352  | 1728<br>9515 | 2183  | 9000  |
| 1984.00 | 0      | 88433   | 243542 | 224354          | 146096 | 22716         | 21654  | 28299  |              |       | 470   |
| 1985.00 | 9022   | 216740  | 337591 | 302782          | 147670 | 42404         | 14075  | 18178  | 7997         | 1201  | 349   |
| 1986.00 | 63     | 125300  | 275903 | 292792          | 56937  | 31599         | 10770  | 4320   | 2942         | 1356  |       |
| 1987.00 | 2300   | 82940   | 126436 | 527443          | 242597 | 45933         | 19481  | 7292   | 3361         | 3120  | 650   |
| 1988.00 | 151    | 148399  | 113208 | 195096          | 434192 | 236089        | 42533  | 21208  | 4186         | 3797  | 2845  |
| 1989.00 | 8      | 101788  | 114095 | 61842           | 79451  | 169023        | 76684  | 18303  | 8270         | 3814  | 3057  |
| 1990.00 | 0      | 178532  | 130176 | 171560          | 89922  | 101066        | 201901 | 116788 | 31466        | 10572 | 6848  |
| 1991.00 | 0      |         | 179463 | 183647          | 88431  | 41352         | 50380  | 80732  | 45516        | 18291 | 13524 |
| 1992.00 | 9      |         | 132642 | 286923          | 126510 | 75473         | 34458  | 35369  | 59136        | 34558 | 20653 |
| 1993.00 | 166    |         | 43766  | 194198          | 130713 | 67708         | 33820  | 21481  | 21893        | 20684 | 11175 |
| 1994.00 | 151    | 103885  | 142260 | 53700           | 118015 | 72512         | 36059  | 14889  | 8706         | 10447 | 15533 |
| 1995.00 | 1631   | 113457  | 219777 | 112245          | 36784  | 36402         | 22127  | 6474   | 4217         | 2957  | 3566  |
| 1996.00 | 0      | 37496   | 37715  | 256063          | 54534  | 16862         | 9151   | 3300   | 1782         | 1310  | 1605  |
| 1997.00 | 356    | 56561   | 87395  | 78098           | 131062 | 18917         | 5131   | 3636   | 894          | 620   | 874   |
| 1998.00 | 137    | 264901  | 62322  | 138751          | 97065  | 97464         | 20679  | 3856   | 1730         | 1288  | 398   |
| 1999.00 | 2694   | 112893  | 223263 | 147840          | 131463 | 57291         | 10044  | 613    | 212          | 70    | 13    |
| 2000.00 | 841    | 364078  | 75330  | 108560          | 124083 | 60754         | 25829  | 4454   | 251          | 33    | 23    |
| 2001.00 | 51     | 73368   | 325273 | 57175           | 60409  | 31891         | 15509  | 2203   | 304          | 8     | 4     |
| 2002.00 | 15500  | 303723  | 98597  | 210620          | 75258  | 27973         | 12846  | 1577   | 70           | 23    | 3     |
| 2003.00 | 459    |         | 342592 | 114850          | 96847  | 13111         | 7136   | 435    | 23           | .0    | - 0   |
| 2004.00 | 3142   |         | 347693 | 132570          | 79884  | 9351          | 3226   | 339    | 36           | 1     | 0     |
| 2005.00 | 135    |         | 171155 | 180893          | 28030  | 4286          | 1050   | 49     | 2            | 2     | 0     |
| 2006.00 |        |         |        |                 |        |               |        |        |              |       |       |

| German Only | Acoustic   |           |          |             |                 |           |
|-------------|------------|-----------|----------|-------------|-----------------|-----------|
|             | 2          | 3         |          |             | 7               |           |
| 1999.65     | 0.00 9924. | .46 ***** | ******   | *******     | ****** 5561.4   | 2 6599.39 |
| 2000.65***  | ********   |           |          | ********    | ******26262.7   | 7 1630.55 |
| 2001.65852  | 38.48***** |           |          |             | 1752.1012399.9  | 5 1752,70 |
| 2002.65788  | 23.76***** | *******   |          | *****       | 0875.3813560.0  | 1 757.96  |
| 2003.65***  | ********   |           |          | **71924.993 | 86656.17 1716.6 | 4 0.00    |
| 2004.65225  | 02.50***** |           | ******** | +96777.683  | 7006.73 2585.6  | 7 2271.29 |
| 2005.65 34  | 89.34***** |           |          | * 46492.961 | 4538.91 597.2   | 6 0.00    |

Index Type and Model Form

Index Type and Model Form
ID# b Label b Age Group(s) b Index Type b Model Form
I German Only Acoustic 2 Abundance Proportional
German Only Acoustic 3 Abundance Proportional
German Only Acoustic 4 Abundance Proportional
German Only Acoustic 5 Abundance Proportional
German Only Acoustic 6 Abundance Proportional
German Only Acoustic 7 Abundance Proportional
German Only Acoustic 8 Abundance Proportional

52

```
8 German Only Acoustic 9 Abundance Proportional
Index Inclusion
ID# on same line have common catchability
VPA setup
Plus Group : Yes, using FIRST method
Population
                                    4
                                              5
                                                     6
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                                                                     8
                                                                             - 9
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                                                                                             (500)
1965.00
 2005.00******
                                                            5000
 2006.00******
Fratios
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 1969.00
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 1974.00
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 1976.00
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 1987.00
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 1988.00
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 1989.00
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 1990.00
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 1991.00
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 1992.00
                                                                                  **wtd**
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                                                                     1.00
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 1993.00
                                                                                  **WEd**
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 1994.00
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 1995.00
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 1996.00
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 1997.00
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 1998.00
                                                                             1.00 **wtd**
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 1999.00
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 2000.00
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 2001.00
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 2002.00
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 2002.00
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                                                                             1.00 **wtd**
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                                                                     1.00
 2004.00
                                                    0.20
 2005.00
 2005.00
                                                    0.40
                                                    0.70
 2005.00
 2005.00
                                                    0.90
                                                    1.00 ******
 2005.00
 2005.00
                                                    1.00
                                                                         ......
 2005.00
                                                    1.00
                                                    1.00
 2005.00
Natural Mortality
                                                                                      10
                                                      6
                                                                                               11+
                                                                                    (0.20)
                                                                                            (0.20)
 1965.00 (0.20)
                  (0.20)
                           (0.20)
                                  (0.20)
                                           (0.20)
                                                    (0.20)
                                                            (0.20) (0.20) (0.20)
                                                                                             (0.20)
                                   (0.20)
                                           (0.20)
                                                    (0.20)
                                                            (0.20)
                                                                    (0.20) (0.20)
                                                                                    (0.20)
 1966.00 (0.20)
                   (0.20)
                           (0.20)
                                                                                             (0.20)
                  (0.20)
                           (0.20)
                                   (0.20)
                                           (0.20)
                                                    (0.20)
                                                            (0.20)
                                                                    (0.20)
                                                                           (0.20)
                                                                                    (0.20)
 1967.00 (0.20)
                                                                                            (0.20)
                   (0.20)
                           (0.20)
                                  (0.20)
                                           (0.20)
                                                   (0.20)
                                                            (0.20)
                                                                   (0.20)
                                                                            (0.20)
                                                                                    (0.20)
 1968.00 (0.20)
                  (0.20)
                           (0.20)
                                  (0.20)
                                           (0.20)
                                                   (0.20)
                                                            (0.20)
                                                                   (0.20)
                                                                           (0.20)
                                                                                    (0.20)
                                                                                            (0.20)
 1969.00 (0.20)
```

Appendix C. VPA formulation and model output with German Bank acoustic index (ages 4-8).

| 1070 00   | (0.20)   | (0.20)   | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  | (0.20)   | (0.20)   | (0.20)   |
|---|--|--|--|--|---|---|---|---|--|--|--|
| 1970.00   |  |  |  |  |   |   |   |   |  |  |  |
| 1971.00   | (0.20)   | (0.20)   | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  | (0.20)   | (0.20)   | (0.20)   |
| 1972.00   | (0.20)   | (0.20)   | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.Z0)  | (0.20)  | (0.20)   | (0.20)   | (0.20)   |
| 1973.00   | (0.20)   | (0.20)   | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  | (0.20)   | (0.20)   | (0.20)   |
|   |  |  |  |  |   |   |   |   |  |  |  |
| 1974.00   | (0.20)   | (0.20)   | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  | (0.20)   | (0.20)   | (0.20)   |
| 1975.00   | (0.20)   | (0.20)   | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  | (0.20)   | (0.20)   | (0.20)   |
| 1976.00   | (0.20)   | (0.20)   | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  | (0.20)   | (0.20)   | (0.20)   |
|   |  |  |  |  |   | (0.20)  |   | (0.20)  | (0.20)   | (0.20)   | (0.20)   |
| 1977.00   | (0.20)   | (0.20)   | (0.20)   | (0.20)   | (0.20)  |   | (0.20)  |   |  |  |  |
| 1978.00   | (0.20)   | (0.20)   | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  | (0.20)   | (0.20)   | (0.20)   |
| 1979.00   | (0.20)   | (0.20)   | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  | (0.20)   | (0.20)   | (0.20)   |
|   |  |  |  |  |   |   |   |   |  |  | (0.20)   |
| 1980.00   | (0.20)   | (0.20)   | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.Z0)  | (0.20)  | (0.20)   | (0.20)   |  |
| 1981.00   | (0.20)   | (0.20)   | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  | (0.20)   | (0.20)   | (0.20)   |
| 1982.00   | (0.20)   | (0.20)   | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  | (0.20)   | (0.20)   | (0.20)   |
|   |  |  |  |  |   |   |   |   |  | (0.20)   | (0.20)   |
| 1983.00   | (0.20)   | (0.20)   | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  | (0.20)   |  |  |
| 1984.00   | (0.20)   | (0.20)   | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  | (0.20)   | (0.20)   | (0.20)   |
| 1985.00   | (0.20)   | (0.20)   | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  | (0.20)   | (0.20)   | (0.20)   |
|   |  |  |  |  |   |   |   |   | (0.20)   | (0.20)   | (0.20)   |
| 1986.00   | (0.20)   | (0.20)   | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  |  |  |  |
| 1987.00   | (0.20)   | (0.20)   | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  | (0.20)   | (0.20)   | (0.20)   |
| 1988.00   | (0.20)   | (0.20)   | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  | (0.20)   | (0.20)   | (0.20)   |
|   |  |  |  |  |   |   |   |   |  |  |  |
| 1989.00   | (0.20)   | (0.20)   | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.Z0)  | (0.20)  | (0.20)   | (0.20)   | (0.20)   |
| 1990.00   | (0.20)   | (0.20)   | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  | (0.20)   | (0.20)   | (0.20)   |
| 1991.00   | (0.20)   | (0.20)   | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  | (0.20)   | (0.20)   | (0.20)   |
|   |  |  |  |  |   |   |   |   |  | (0.20)   | (0.20)   |
| 1992.00   | (0.20)   | (0.20)   | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  | (0.20)   |  |  |
| 1993.00   | (0.20)   | (0.20)   | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  | (0.20)   | (0.20)   | (0.20)   |
| 1994.00   | (0.20)   | (0.20)   | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  | (0.20)   | (0.20)   | (0.20)   |
|   |  |  |  |  |   |   |   |   |  |  |  |
| 1995.00   | (0.20)   | (0.20)   | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  | (0.20)   | (0.20)   | (0.20)   |
| 1996.00   | (0.20)   | (0.20)   | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  | (0.20)   | (0.20)   | (0.20)   |
| 1997.00   | (0.20)   | (0.20)   | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  | (0.20)   | (0.20)   | (0.20)   |
|   |  |  |  |  |   |   |   |   |  |  |  |
| 1998.00   | (0.20)   | (0.20)   | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  | (0.20)   | (0.20)   | (0.20)   |
| 1999.00   | (0.20)   | (0.20)   | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  | (0.20)   | (0.20)   | (0.20)   |
| 2000.00   | (0.20)   | (0.20)   | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  | (0.20)   | (0.20)   | (0.20)   |
|   |  |  |  |  |   |   |   |   | (0.20)   |  | (0.20)   |
| 2001.00   | (0.20)   | (0.20)   | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  |  | (0.20)   |  |
| 2002.00   | (0.20)   | (0.20)   | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  | (0.20)   | (0.20)   | (0.20)   |
| 2003.00   | (0.20)   | (0.20)   | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  | (0.20)   | (0.20)   | (0.20)   |
|   |  |  |  |  |   |   |   |   |  |  | (0.20)   |
| 2004.00   | (0.20)   | (0.20)   | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  | (0.20)   | (0.20)   |  |
| 2005.00   | (0.20)   | (0.20)   | (0.20)   | (0.20)   | (0.20)  | (0.20)  | (0.20)  | (0.20)  | (0.20)   | (0.20)   | (0.20)   |
| Virtual B   |  | n Analys   | eie nein   | initial  | values  |   |   |   |  |  |  |
|   |  |  |  |  |   |   |   |   |  |  |  |
|   |  |  |  |  |   |   |   |   |  |  |  |
|   |  |  |  |  |   |   |   |   |  |  |  |
| Populatio   | n Number   |  |  |  |   |   |   |   |  |  |  |
| Populatio   |  | s  |  |  |   | 6   | 7   | 8   | à  | 10   | 11+  |
|   | 1  | 2  | 3  | 4  | 5   | 62556   | 7   | 8   |  | 10   | 11+  |
| 1965.00   | 3503534  | s 2<br>3848688   | 3<br>995990  | 1312007  | 5<br>348049   | 9255€   | 44658   | 4104  | 1354   | 406  | 500  |
| 1965.00   | 1  | s 2<br>3848688   | 3  | 4  | 5   |   |   |   |  |  | 500<br>707   |
| 1965.00<br>1966.00  | 3503534<br>2737874   | 3848688<br>2624572   | 3<br>995990<br>2177169   | 4<br>1312007<br>784001   | 5<br>348049<br>863223   | 92556<br>239988   | 44658<br>66231  | 4104<br>35035   | 1354<br>2855   | 406  | 500  |
| 1965.00<br>1966.00<br>1967.00   | 1<br>3503534<br>2737874<br>6078739   | 3848688<br>2624572<br>2102325  | 3<br>995990<br>2177169<br>1329624  | 4<br>1312007<br>784001<br>1378701  | 5<br>348049<br>863223<br>575717   | 92556<br>239988<br>418512   | 44658<br>66231<br>155171  | 4104<br>35035<br>41661  | 1354<br>2855<br>21740  | 406<br>1060<br>836   | 500<br>707<br>1253   |
| 1965.00<br>1966.00<br>1967.00<br>1968.00  | 1<br>3503534<br>2737874<br>6078739<br>1286168  | 2<br>3848688<br>2624572<br>2102325<br>4325977  | 3<br>995990<br>2177169<br>1329624<br>1170158   | 4<br>1312007<br>784001<br>1378701<br>950142  | 5<br>348049<br>863223<br>575717<br>889042   | 92556<br>239988<br>418512<br>372334   | 44658<br>66231<br>155171<br>200109  | 4104<br>35035<br>41661<br>75150   | 1354<br>2855<br>21740<br>30056   | 406<br>1060<br>836<br>17430  | 500<br>707<br>1253<br>1311   |
| 1965.00<br>1966.00<br>1967.00<br>1968.00  | 1<br>3503534<br>2737874<br>6078739   | 2<br>3848688<br>2624572<br>2102325<br>4325977  | 3<br>995990<br>2177169<br>1329624  | 4<br>1312007<br>784001<br>1378701  | 5<br>348049<br>863223<br>575717   | 92556<br>239988<br>418512   | 44658<br>66231<br>155171  | 4104<br>35035<br>41661  | 1354<br>2855<br>21740  | 406<br>1060<br>836   | 500<br>707<br>1253   |
| 1965.00<br>1966.00<br>1967.00<br>1968.00<br>1969.00   | 1<br>3503534<br>2737874<br>6078739<br>1286168<br>1754254   | 3848688<br>2624572<br>2102325<br>4325977<br>904620   | 3<br>995990<br>2177169<br>1329624<br>1170158<br>1415817  | 4<br>1312007<br>784001<br>1378701<br>950142<br>755635  | 5<br>348049<br>863223<br>575717<br>889042<br>702962   | 92556<br>239988<br>418512<br>372334<br>467578   | 44658<br>66231<br>155171<br>200109<br>239085  | 4104<br>35035<br>41661<br>75150<br>82892  | 1354<br>2855<br>21740<br>30056<br>32938  | 406<br>1060<br>836<br>17430  | 500<br>707<br>1253<br>1311   |
| 1965.00<br>1966.00<br>1967.00<br>1968.00<br>1969.00<br>1970.00  | 1<br>3503534<br>2737874<br>6078739<br>1286168<br>1754254<br>2304087  | 3848688<br>2624572<br>2102325<br>4325977<br>904620<br>1338027  | 3<br>995990<br>2177169<br>1329624<br>1170158<br>1415817<br>480252  | 4<br>1312007<br>784001<br>1378701<br>950142<br>755635<br>682955  | 5<br>348049<br>863223<br>575717<br>889042<br>702962<br>499556   | 92556<br>239988<br>418512<br>372334<br>467578<br>429512   | 44658<br>66231<br>155171<br>200109<br>239085<br>281595  | 4104<br>35035<br>41661<br>75150<br>82692<br>139599  | 1354<br>2855<br>21740<br>30056<br>32938<br>47575   | 406<br>1060<br>836<br>17430<br>10845<br>21258  | 500<br>707<br>1253<br>1311<br>9244<br>13377  |
| 1965.00<br>1966.00<br>1967.00<br>1968.00<br>1969.00<br>1970.00  | 1<br>3503534<br>2737874<br>6078739<br>1286168<br>1754254<br>2304087<br>7460417   | 2<br>3848688<br>2624572<br>2102325<br>4325977<br>904620<br>1338027<br>1258574  | 3<br>995990<br>2177169<br>1329624<br>1170158<br>1415817<br>480252<br>579796  | 4<br>1312007<br>784001<br>1378701<br>950142<br>755635<br>682955<br>324285  | 5<br>348049<br>863223<br>57517<br>889042<br>702962<br>499556<br>303152  | 92556<br>239988<br>418512<br>372334<br>467578<br>429512<br>228973   | 44658<br>66231<br>155171<br>200109<br>239085<br>281595<br>243661  | 4104<br>35035<br>41661<br>75150<br>82892<br>139599<br>130382  | 1354<br>2855<br>21740<br>30056<br>32938<br>47575<br>77266  | 406<br>1060<br>836<br>17430<br>10845<br>21258<br>19947   | 500<br>707<br>1253<br>1311<br>9244<br>13377<br>19640   |
| 1965.00<br>1966.00<br>1967.00<br>1968.00<br>1969.00<br>1970.00  | 1<br>3503534<br>2737874<br>6078739<br>1286168<br>1754254<br>2304087  | 2<br>3848688<br>2624572<br>2102325<br>4325977<br>904620<br>1338027<br>1258574  | 3<br>995990<br>2177169<br>1329624<br>1170158<br>1415817<br>480252  | 4<br>1312007<br>784001<br>1378701<br>950142<br>755635<br>682955  | 5<br>348049<br>863223<br>575717<br>889042<br>702962<br>499556   | 92556<br>239988<br>418512<br>372334<br>467578<br>429512   | 44658<br>66231<br>155171<br>200109<br>239085<br>281595  | 4104<br>35035<br>41661<br>75150<br>82692<br>139599  | 1354<br>2855<br>21740<br>30056<br>32938<br>47575<br>77266<br>61966   | 406<br>1060<br>836<br>17430<br>10845<br>21258<br>19947<br>30575  | 500<br>707<br>1253<br>1311<br>9244<br>13377<br>19640<br>20551  |
| 1965.00<br>1966.00<br>1967.00<br>1968.00<br>1969.00<br>1970.00<br>1971.00<br>1972.00  | 1<br>3503534<br>2737874<br>6078739<br>1286168<br>1754254<br>2304087<br>7460417<br>1138007  | 2<br>3848688<br>2624572<br>2102325<br>4325977<br>904620<br>1338027<br>1258574<br>6028985   | 3<br>995990<br>2177169<br>1329624<br>1170158<br>1415817<br>480252<br>579796<br>667899  | 4<br>1312007<br>784001<br>1378701<br>950142<br>755635<br>682955<br>324285<br>309749  | 5<br>348049<br>863223<br>575717<br>889042<br>702962<br>499556<br>303152<br>169889   | 92556<br>239988<br>418512<br>372334<br>467578<br>429512<br>228973<br>146502   | 44658<br>66231<br>155171<br>200109<br>239085<br>281595<br>243661  | 4104<br>35035<br>41661<br>75150<br>82892<br>139599<br>130382  | 1354<br>2855<br>21740<br>30056<br>32938<br>47575<br>77266  | 406<br>1060<br>836<br>17430<br>10845<br>21258<br>19947   | 500<br>707<br>1253<br>1311<br>9244<br>13377<br>19640   |
| 1965.00<br>1966.00<br>1967.00<br>1968.00<br>1969.00<br>1970.00<br>1971.00<br>1972.00<br>1973.00   | 1<br>3503534<br>2737874<br>6078739<br>1286168<br>1754254<br>2304087<br>7460417<br>1138007<br>2336523   | 3848688<br>2624572<br>2102325<br>4325977<br>904620<br>1338027<br>1258574<br>6028985<br>931722  | 3<br>995990<br>2177169<br>1329624<br>1170158<br>1415817<br>480252<br>579796<br>667899<br>4350854   | 4<br>1312007<br>784001<br>1378701<br>950142<br>755635<br>682955<br>324285<br>309749<br>481941  | 5<br>348049<br>863223<br>575717<br>889042<br>702962<br>499558<br>30152<br>169889<br>121063  | 92556<br>239988<br>418512<br>372334<br>467578<br>429512<br>228973<br>146502<br>70132  | 44658<br>66231<br>155171<br>200109<br>239085<br>281595<br>243661<br>119687<br>52761   | 4104<br>35035<br>41661<br>75150<br>82892<br>139599<br>130382<br>115682<br>54102   | 1354<br>2855<br>21740<br>30056<br>32938<br>47575<br>77266<br>61966<br>51165  | 406<br>1060<br>836<br>17430<br>10845<br>21258<br>19947<br>30575<br>27434   | 500<br>707<br>1253<br>1311<br>9244<br>13377<br>19640<br>20551<br>19153   |
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3<br>995990<br>2177169<br>1329624<br>1170158<br>1415817<br>480252<br>579796<br>667899<br>4350854<br>4350854<br>4345406<br>2426553<br>710839<br>289532<br>959467<br>1027010<br>1368174<br>2650014<br>3174295<br>1107935<br>635504<br>801233<br>847830<br>1008567<br>707394<br>237693<br>4845628<br>656219<br>656228                                       | 4<br>1312007<br>764001<br>1378701<br>1378701<br>950142<br>755635<br>682955<br>324285<br>309749<br>481941<br>2859195<br>505119<br>461878<br>245946<br>1762596<br>509412<br>191249<br>649785<br>705445<br>705445<br>705445<br>245946<br>191249<br>649785<br>705445<br>705445<br>707942<br>1865457<br>793142<br>418412<br>553220<br>576914<br>418412<br>553220<br>576914<br>418412<br>553220<br>576914<br>6459804<br>155220<br>268195<br>641941<br>363581   | 5<br>348049<br>863223<br>575717<br>889042<br>702962<br>499556<br>303152<br>169889<br>121063<br>277069<br>1619372<br>229479<br>275572<br>183136<br>41184<br>12252<br>1017308<br>324646<br>136177<br>313499<br>376337<br>466203<br>1263651<br>1449860<br>474051<br>286868<br>299026<br>307618<br>287340<br>202812<br>78955<br>119202<br>296445<br>227441  | 92556<br>239988<br>372334<br>467578<br>429512<br>70132<br>63139<br>165491<br>864256<br>126138<br>119041<br>41880<br>28826<br>99518<br>429491<br>177675<br>89457<br>126231<br>177675<br>816306<br>797404<br>316593<br>154203<br>165457<br>16593<br>165457<br>16593<br>165457<br>16593<br>165457<br>16593<br>165457<br>16593<br>165457<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16593<br>16 | 44658 66231 155171 200109 239085 281595 243661 119687 52761 30305 34561 76167 466414 57492 36645 13695 19663 31501 63382 91079 52832 65334 115618 229118 456413 500847 168557 89111 68056 53150 32668 17745   | 4104<br>35035<br>41661<br>75150<br>82892<br>139599<br>130382<br>115682<br>54102<br>23481<br>17278<br>43093<br>223170<br>19392<br>13722<br>7007<br>13919<br>29368<br>53687<br>55107<br>30614<br>43794<br>77122<br>149310<br>304643<br>229416<br>92791<br>325557<br>11627<br>7177<br>6373         | 1354<br>2855<br>21740<br>30056<br>32938<br>47575<br>26162<br>13330<br>8846<br>9149<br>22748<br>85497<br>5372<br>5380<br>3261<br>9523<br>14768<br>21173<br>29291<br>44098<br>105751<br>144866<br>115487<br>44305<br>15331<br>7693<br>3759<br>2929   | 406<br>1060<br>17430<br>10845<br>21258<br>19947<br>30575<br>27434<br>20577<br>10013<br>6633<br>3712<br>4650<br>8737<br>33069<br>1742<br>2687<br>1459<br>6242<br>14308<br>20942<br>14308<br>20211<br>28662<br>58343<br>77777<br>4810<br>2545<br>487   | 500<br>707<br>1253<br>1311<br>9244<br>13377<br>19640<br>20551<br>19153<br>15921<br>15485<br>11863<br>10203<br>6640<br>5577<br>5530<br>19616<br>15067<br>12505<br>9665<br>3339<br>4231<br>8641<br>20920<br>31602<br>45143<br>51315<br>47773<br>29629<br>22358<br>17773          |

Appendix C. VPA formulation and model output with German Bank acoustic index (ages 4-8).

| 2000 00   | 700000   | 1202420           | 313795 | 258420 | 197789 | 88303 | 30480 | 5174  | 279   | 44.   | 9547  |
|-----------|----------|-------------------|--------|--------|--------|-------|-------|-------|-------|-------|-------|
| 2000.00   |          | 1393439<br>579463 | 813807 | 189211 | 114499 | 51897 | 18599 | 2432  | 359   | 11    | 7803  |
|           | 1396028  |                   | 408314 | 375233 | 103608 | 39933 | 14190 | 1682  | 88    | 29    | 6387  |
|           | 2336388  |                   | 662950 | 245688 | 119859 | 18475 | 7989  | 518   | 26    | 11    | 5230  |
|           | 1808667  |                   |        | 237472 | 98615  | 13315 | 3554  | 361   | 45    | 1     | 4291  |
| 2004.00   |          | 1480397           |        |        | 76483  | 10792 | 2644  | 123   | 5     | 5     | 3513  |
|           | 1000000  | 737133            | 923717 | 603204 | 331532 | 37512 | 5000  | 1225  | 57    | 2     | 2879  |
| 2006.00   | 1000000  | 818609            | 538562 | 602250 | 331332 | 31312 | 3000  | 1223  | 31    | -     | 2015  |
| Fishing b | Mortalit | y                 |        |        |        |       |       |       |       |       |       |
|           | 1        | 2                 | 3      | 4      | 5      | 6     | 7     | 8     | 9     | 10    | 11+   |
| 1965.00   | 0.089    | 0.370             | 0.039  | 0.219  | 0.172  | 0.135 | 0.043 | 0.163 | 0.045 | 0.106 | 0.002 |
| 1966.00   | 0.064    | 0.480             | 0.257  | 0.109  | 0.524  | 0.236 | 0.264 | 0.277 | 1.028 | 0.252 | 0.002 |
| 1967.00   | 0.140    | 0.386             | 0.136  | 0.239  | 0.236  | 0.538 | 0.525 | 0.127 | 0.021 | 0.490 | 0.139 |
| 1968.00   | 0.152    | 0.917             | 0.237  | 0.101  | 0.443  | 0.243 | 0.681 | 0.625 | 0.819 | 0.440 | 2.943 |
| 1969.00   | 0.071    | 0.433             | 0.529  | 0.214  | 0.293  | 0.307 | 0.338 | 0.355 | 0.238 | 0.318 | 0.090 |
| 1970.00   | 0.405    | 0.636             | 0.193  | 0.612  | 0.580  | 0.367 | 0.570 | 0.392 | 0.669 | 0.450 | 0.248 |
| 1971.00   | 0.013    | 0.434             | 0.427  | 0.446  | 0.527  | 0.449 | 0.545 | 0.544 | 0.727 | 0.533 | 0.383 |
| 1972.00   | 0.000    | 0.126             | 0.126  | 0.739  | 0.685  | 0.821 | 0.594 | 0.616 | 0.615 | 0.678 | 0.960 |
| 1973.00   | 0.000    | 0.220             | 0.220  | 0.354  | 0.451  | 0.639 | 0.610 | 0.527 | 0.711 | 0.622 | 1.402 |
| 1974.00   | 0.013    | 0.576             | 0.164  | 0.369  | 0.315  | 0.403 | 0.462 | 0.366 | 0.760 | 0.475 | 0.958 |
| 1975.00   | 0.014    | 0.308             | 0.355  | 0.397  | 0.428  | 0.576 | 0.493 | 0.370 | 0.498 | 0.545 | 0.579 |
| 1976.00   | 0.000    | 0.365             | 0.338  | 0.406  | 0.398  | 0.417 | 0.370 | 0.436 | 0.668 | 0.416 | 0.383 |
| 1977.00   | 0.000    | 0.337             | 0.364  | 0.725  | 0.639  | 0.586 | 0.537 | 0.439 | 0.477 | 0.539 | 0.540 |
| 1978.00   | 0.029    | 0.133             | 0.140  | 0.248  | 1.275  | 0.978 | 0.887 | 0.759 | 0.757 | 0.838 | 0.324 |
| 1979.00   | 0.001    | 0.209             | 0.121  | 0.280  | 0.157  | 0.918 | 0.782 | 1.084 | 0.750 | 0.830 | 0.639 |
| 1980.00   | 0.002    | 0.038             | 0.133  | 0.350  | 0.225  | 0.183 | 0.470 | 0.73€ | 0.926 | 0.435 | 0.776 |
| 1981.00   | 0.000    | 0.092             | 0.215  | 0.251  | 0.662  | 0.451 | 0.145 | 0.565 | 0.494 | 0.413 | 0.129 |
| 1982.00   | 0.002    | 0.086             | 0.190  | 0.140  | 0.403  | 0.767 | 0.370 | 0.180 | 0.604 | 0.708 | 0.077 |
| 1983.00   | 0.001    | 0.119             | 0.176  | 0.529  | 0.220  | 0.468 | 0.913 | 0.487 | 0.222 | 0.655 | 0.124 |
| 1984.00   | 0.000    | 0.030             | 0.218  | 0.428  | 0.710  | 0.327 | 0.302 | 0.852 | 1.195 | 0.483 | 3.753 |
| 1985.00   | 0.005    | 0.060             | 0.151  | 0.459  | 0.560  | 0.459 | 0.346 | 0.448 | 0.627 | 0.445 | 0.168 |
| 1986.00   | 0.000    | 0.097             | 0.101  | 0.190  | 0.144  | 0.220 | 0.200 | 0.169 | 0.119 | 0.201 | 0.095 |
| 1987.00   | 0.002    | 0.111             | 0.134  | 0.283  | 0.237  | 0.166 | 0.205 | 0.202 | 0.192 | 0.179 | 0.087 |
| 1988.00   | 0.000    | 0.154             | 0.218  | 0.315  | 0.398  | 0.381 | 0.228 | 0.359 | 0.171 | 9.344 | 0.163 |
| 1989.00   | 0.000    | 0.103             | 0.170  | 0.177  | 0.204  | 0.265 | 0.204 | 0.145 | 0.231 | 0.232 | 0.160 |
| 1990.00   | 0.000    | 0.148             | 0.185  | 0.415  | 0.421  | 0.430 | 0.581 | 0.543 | 0.395 | 0.517 | 0.300 |
| 1991.00   | 0.000    | 0.117             | 0.218  | 0.429  | 0.392  | 0.348 | 0.397 | 0.486 | 0.422 | 0.421 | 0.630 |
| 1992.00   | 0.000    | 0.492             | 0.231  | 0.638  | 0.597  | 0.688 | 0.550 | 0.539 | 0.815 | 0.663 | 0.691 |
| 1993.00   | 0.000    | 0.133             | 0.226  | 0.619  | 0.686  | 0.759 | 0.779 | 0.810 | 0.773 | 0.773 | 0.273 |
| 1994.00   | 0.000    | 0.087             | 0.389  | 0.476  | 0.999  | 1.089 | 1,320 | 1.001 | 0.959 | 1.126 | 0.440 |
| 1995.00   | 0.002    | 0.191             | 0.268  | 0.611  | 0.709  | 1.037 | 1.315 | 0.929 | 0.906 | 1.098 | 0.142 |
| 1996.00   | 0.000    | 0.050             | 0.089  | 0.573  | 0.691  | 0.860 | 0.824 | 0.696 | 0.727 | 0.822 | 0.082 |
| 1997.00   | 0.000    | 0.087             | 0.158  | 0.269  | 0.659  | 0.550 | 0.709 | 0.967 | 0.407 | 0.608 | 0.056 |
| 1998.00   | 0.000    | 0.354             | 0.130  | 0.403  | 0.627  | 1.787 | 2,934 | 2.558 | 2.597 | 1.990 | 0.031 |
| 1999.00   | 0.002    | 0.280             | 0.573  | 0.513  | 0.844  | 0.982 | 1.003 | 1.082 | 1.657 | 0.988 | 0.001 |
| 2000.00   | 0.001    | 0.338             | 0.306  | 0.614  | 1.138  | 1.358 | 2.328 | 2.468 | 3.009 | 1.646 | 0.003 |
| 2001.00   |          | 0.150             | 0.574  | 0.402  | 0.853  | 1.097 | 2.203 | 3.121 | 2.321 | 1.451 | 0.001 |
| 2002.00   |          | 0.345             | 0.308  | 0.941  | 1.524  | 1.409 | 3.110 | 3.973 | 1.919 | 1.919 | 0.001 |
| 2003.00   | 0.000    | 0.330             | 0.827  | 0.713  | 1.997  | 1.448 | 2.898 | 2.251 | 2,811 | 0.000 | 0.000 |
| 2004.00   |          | 0.272             | 0.417  | 0.933  | 2.012  | 1.417 | 3.160 | 4.071 | 1.983 | 1.832 | 0.000 |
| 2005.00   | 0.000    | 0.114             | 0.228  | 0.399  | 0.512  | 0.569 | 0.569 | 0.569 | 0.569 | 0.569 | 0.000 |
|           |          |                   |        |        |        |       |       |       |       |       |       |

LAMBDA 1.00000Eý2 RSS 1.78222E1 NPHI 1.78222E1

Parameters 8.51719E0

LAMBDA 1.00000Eý3 RSS 1.71891E1 NPHI 1.71891E1

Parameters 8,11718E0

LAMBDA 1.00000Eý4 RSS 1.71338E1 NPHI 1.71338E1

Parameters 7.99328E0

LAMBDA 1.00000Ey5 RSS 1.71289E1

| 1999.00 1702410 507111 559662 403313 250907 99434 17222 1005 262 421 42 1200 100 100638 1381382 313682 258413 197784 88393 30480 5174 279 44 9547 2001.00 1250681 572875 812126 18918 114494 51893 18599 2432 359 17803 17803 2002.00 2032796 1105798 402922 373864 103532 39292 14187 1682 88 29 6387 2003.00 1293921 1650313 632615 241280 118755 18415 7886 516 26 11 5230 2003.00 1293921 1650313 632615 241280 118755 18415 7886 516 26 11 5230 2003.00 1293922 1650313 632615 241280 118755 18415 7886 516 26 11 5230 2003.00 1000000 502469 646167 437560 56746 8094 1983 93 4 3513 2003.00 1000000 502469 646167 437560 56746 8094 1983 93 4 3513 28003.00 1000000 818609 346497 375305 196450 21458 2809 688 32 1 2877 2066.00 1000000 1818609 346497 375305 196450 21458 2809 688 32 1 2877 2066.00 0.064 0.400 0.257 0.109 0.524 0.236 0.264 0.277 1.028 0.252 0.002 1866.00 0.664 0.480 0.257 0.109 0.524 0.236 0.264 0.277 1.028 0.252 0.002 1867.00 0.140 0.366 0.136 0.239 0.226 0.538 0.525 0.127 0.109 0.140 0.316 0.136 0.136 0.239 0.236 0.538 0.525 0.127 0.109 0.140 0.316 0.136 0.339 0.256 0.378 0.325 0.127 0.128 0.293 0.301 1896.00 0.152 0.917 0.237 0.101 0.443 0.243 0.881 0.625 0.892 0.440 0.2943 1891.00 0.000 0.071 0.433 0.529 0.214 0.239 0.307 0.338 0.355 0.127 0.533 0.383 1971.00 0.000 0.220 0.220 0.354 0.550 0.336 0.355 |            |          |         |        |        |               | 00424 | 17222 | 1005  | 282   | 121   | 11630 |
|--|------------|----------|---------|--------|--------|---------------|-------|-------|-------|-------|-------|-------|
| 2000.00 700638 1391392 313882 258413 137764 5859 128599 2432 359 11 7803 2001.00 1350681 572875 81216 18918 114494 51893 182599 2432 359 11 7803 2002.00 2032796 1105796 402922 373864 103532 33928 18259 516 26 11 5230 2003.00 1393923 16503313 62265 241280 118755 148141 7866 516 26 11 5230 2003.00 1393923 16503313 62265 241280 118755 148141 7866 516 26 11 5230 2004.00 617184 1140833 914664 212938 95037 12475 3050 356 43 1 4251 2005.00 1000000 818609 346497 375305 156450 21458 2809 688 32 1 2877 2006.00 1000000 818609 346497 375305 1596450 21458 2809 688 32 1 2877 2006.00 1000000 80 0.054 0.052 0.039 0.219 0.172 0.135 0.043 0.163 0.045 0.106 0.002 11665.00 0.064 0.480 0.257 0.109 0.524 0.236 0.538 0.555 0.127 1.028 0.252 0.002 1566.00 0.054 0.0512 0.917 0.237 0.101 0.433 0.525 0.237 0.021 0.400 0.152 0.917 0.237 0.101 0.443 0.236 0.259 0.214 0.236 0.538 0.555 0.127 0.021 0.490 0.139 1596.00 0.152 0.917 0.237 0.101 0.443 0.243 0.661 0.625 0.819 0.400 0.159 0.517 0.237 0.101 0.443 0.243 0.661 0.625 0.819 0.440 0.243 1597.00 0.001 0.405 0.636 0.139 0.615 0.550 0.127 0.021 0.490 0.139 1596.00 0.011 0.433 0.529 0.214 0.233 0.307 0.338 0.355 0.127 0.021 0.490 0.139 1597.00 0.000 0.220 0.220 0.220 0.220 0.220 0.354 0.491 0.554 0.554 0.544 0.727 0.533 0.381 1597.00 0.000 0.220 0.220 0.220 0.220 0.254 0.447 0.555 0.447 0.727 0.533 0.383 1597.00 0.000 0.220 0.220 0.220 0.254 0.451 0.469 0.554 0.451 0.469 0.555 0.124 0.253 0.367 0.459 0.460 0.477 0.539 0.565 0.596 0.450 0.477 0.539 0.565 0.596 0.450 0.477 0.539 0.460 0.477 0.596 0.491 0.400 0.400 0.337 0.364 0.427 0.448 0.557 0.449 0.554 0.451 0.469 0.554 0.451 0.469 0.555 0.450 0.477 0.596 0.451 0.460 0 | 1999.00 1  | 702410   | 507111  |        |        |               |       |       |       |       | 44    | 9547  |
| 2001.00 1350681 572875 812126 103532 379864 103532 37926 14197 1682 88 29 688 2020.00 2002.00 2002796 1105798 40222 373864 103532 37926 14197 1682 88 29 688 2004.00 617184 1110833 914664 212939 95037 12475 3506 358 43 1 4291 2005.00 1000000 502469 646167 437560 56746 8094 1983 95 4 4 3513 2005.00 1000000 502469 646167 437560 56746 8094 1983 95 4 4 3513 2005.00 1000000 818609 346497 375305 196450 21458 2809 688 32 1 2877 1666.00 0.00 0.00 0.00 0.00 0.00 0.00 0  | 2000.00    | 700638 1 | 1391382 | 313682 |        |               |       |       |       |       | 11    | 7803  |
| 2002.00 2032796 1105798 402922 373864 103532 399.0 1441.7 7866 26 11 5230 2003.00 1393923 1650313 632615 241280 118755 18415 7866 35.6 43 1 4291 2004.00 617184 1140833 914664 212938 95037 12475 3506 35.6 43 1 4291 2005.00 1000000 818609 346497 375305 196450 21458 2809 688 32 1 2877 2006.00 1000000 818609 346497 375305 196450 21458 2809 688 32 1 2877 2006.00 1000000 818609 346497 375305 196450 21458 2809 688 32 1 2877 2006.00 1000000 818609 346497 375305 196450 21458 2809 688 32 1 2877 2006.00 1000000 818609 346497 375305 196450 21458 2809 688 32 1 2877 2006.00 1000000 818609 346497 375305 196450 21458 2809 688 32 1 2877 2006.00 1000000 818609 346497 375305 196450 21458 2809 688 32 1 2877 2006.00 1000000 818609 346497 375305 196450 21458 2809 688 32 1 2877 2006.00 1000000 818609 346497 375305 196450 21458 2809 688 32 1 2877 2006.00 1000000 818609 346497 375305 196450 21458 2809 688 32 1 2877 2006.00 1000000 818609 346497 375305 196450 21458 2809 688 32 1 2877 2006.00 100000 818609 346497 375305 196450 21458 2809 688 32 1 2877 2006.00 10000 818609 346497 375305 196450 21458 2809 688 32 1 2877 2006.00 10000 818609 346497 375305 196450 21458 2809 688 32 1 2877 2006.00 10000 818609 346497 375305 196450 21458 2809 688 32 1 2877 2006.00 1140 21458 2809 819 2440 21458 2809 819 2440 21458 2809 819 2440 21458 2809 819 2440 21458 2809 819 2400 21458 2809 810 2400 21458 2809 819 2400 21458 2809 8100 21458 2809 810  |            |          |         |        |        |               |       |       |       |       |       | 6387  |
| 2003.00 1393923 1690313 632619 24220 2004.00 617184 1140833 914664 21293 55037 12475 3506 358 43 1 4291 2005.00 1000000 502469 646167 437560 56746 8094 1963 93 4 4 5131 2005.00 1000000 818609 346497 375305 196450 21456 2809 688 32 1 2877 2006.00 1000000 818609 346497 375305 196450 21456 2809 688 32 1 2877 2006.00 1000000 818609 346497 375305 196450 21456 2809 688 32 1 2877 2006.00 1000000 818609 346497 375305 196450 21456 2809 688 32 1 2877 2006.00 1000000 818609 346497 375305 196450 21456 2809 688 32 1 2877 2006.00 1000000 818609 346497 375305 196450 21456 2809 688 32 1 2877 2006.00 1000000 818609 346497 375305 196450 21456 2809 688 32 1 2877 2006.00 1000000 818609 346497 375305 196450 21456 2809 688 32 1 2877 2006.00 1000000 818609 346497 375305 196450 21456 2809 688 32 1 2877 2006.00 1000000 818609 346497 375305 196450 21456 2809 688 32 1 2877 2006.00 1000000 818609 34649 2.2493 2.246 | 2002.00 2  | 032796 1 | 1105798 | 402922 |        |               |       |       |       |       |       |       |
| 2004.00 617184 1140833 914664 212938 95037 12475 3006 326 4 4 3513 2005.00 1000000 520469 646167 437560 56746 8094 1983 93 4 4 3513 2877    Fishing Mortality  | 2002.00 2  | 393923 1 | 1650313 | 632615 | 241280 |               |       |       |       |       |       |       |
| 2006.00 10000000 818609 346467 437560 50.446 50.94 1399 688 32 1 2877 2006.00 1000000 818609 346467 375305 196450 21458 2809 688 32 1 2877 2006.00 1000000 818609 346497 375305 196450 21458 2809 688 32 1 2877 2006.00 1000000 818609 346497 375305 196450 21458 2809 688 32 1 2877 2006.00 1000000 1 1 1 1 1 1 1 1 1 1 1 1 1 1   |            | 617184   | 1140833 |        | 212938 |               |       |       |       |       |       |       |
| Fishing Mortality  |            |          | 502469  | 646167 | 437560 | 56746         |       |       |       |       |       |       |
| Fishing Mortality  2   | 2005.00 1  | 000000   |         | 346497 | 375305 | 196450        | 21458 | 2809  | 688   | 34    | *     |       |
| 1 2 3 4 15 16 16 16 16 16 16 16 16 16 16 16 16 16  | 2000.00 1  | 000000   |         |        |        |               |       |       |       |       |       |       |
| 1 965.00 0.889 0.370 0.039 0.219 0.172 0.135 0.043 0.163 0.045 0.106 0.002 1966.00 0.064 0.480 0.257 0.109 0.524 0.236 0.264 0.277 1.028 0.252 0.002 1966.00 0.140 0.386 0.136 0.239 0.236 0.538 0.255 0.227 0.021 0.490 0.139 1968.00 0.152 0.117 0.237 0.101 0.443 0.243 0.681 0.225 0.819 0.440 0.294 1.968.00 0.011 0.433 0.529 0.214 0.239 0.307 0.338 0.355 0.388 0.318 0.000 1969.00 0.405 0.636 0.193 0.612 0.580 0.367 0.570 0.392 0.669 0.450 0.248 1970.00 0.405 0.636 0.126 0.739 0.662 0.367 0.570 0.392 0.669 0.450 0.461 0.615 0.678 0.690 1971.00 0.000 0.226 0.126 0.739 0.665 0.621 0.594 0.616 0.615 0.678 0.690 1973.00 0.000 0.226 0.220 0.354 0.451 0.639 0.610 0.527 0.711 0.622 1.402 1973.00 0.000 0.220 0.220 0.354 0.451 0.639 0.610 0.527 0.711 0.622 1.402 1973.00 0.000 0.365 0.338 0.406 0.396 0.451 0.639 0.430 0.430 0.462 0.366 0.760 0.475 0.998 1975.00 0.000 0.365 0.338 0.406 0.396 0.456 0.576 0.493 0.370 0.488 0.668 0.416 0.383 1976.00 0.000 0.337 0.364 0.725 0.639 0.586 0.557 0.439 0.477 0.539 0.540 1978.00 0.000 0.326 0.338 0.406 0.396 0.417 0.370 0.436 0.668 0.416 0.383 1978.00 0.000 0.229 0.133 0.140 0.248 1.275 0.978 0.887 0.759 0.759 0.757 0.838 0.324 1978.00 0.000 0.326 0.338 0.143 0.289 0.157 0.918 0.762 0.775 0.898 0.477 0.539 0.540 0.610 0.000 0.365 0.338 0.140 0.289 0.157 0.918 0.762 0.765 0.494 0.413 0.289 0.159 0.000 0. | Fishing Mo | rtality  |         |        |        |               | E     | 7     | 9     | 9     | 10    | 11+   |
| 1965.00         0.089         0.370         0.039         0.219         0.112         0.264         0.277         1.028         0.252         0.002           1966.00         0.140         0.386         0.136         0.239         0.236         0.538         0.525         0.127         0.021         0.490         0.319           1967.00         0.140         0.386         0.136         0.239         0.214         0.283         0.681         0.625         0.218         0.440         2.943           1968.00         0.011         0.433         0.529         0.214         0.293         0.307         0.338         0.355         0.286         0.388         0.909           1971.00         0.405         0.636         0.129         0.612         0.580         0.367         0.570         0.592         0.669         0.450         0.228           1971.00         0.000         0.126         0.260         0.354         0.451         0.639         0.610         0.527         0.711         0.622         0.461         0.622         0.711         0.622         0.448         0.527         0.449         0.545         0.545         0.528         0.591         0.512         0.590         0.610 </td <td></td> <td>1</td> <td>2</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>0.106</td> <td>0.002</td>   |            | 1        | 2       |        |        |               |       |       |       |       | 0.106 | 0.002 |
| 1966.00  | 1965.00    | 0.089    | 0.370   |        |        |               |       |       |       |       | 0.252 | 0.002 |
| 1967.00  |            | 0.064    | 0.480   |        |        |               |       |       |       |       | 0.490 | 0.139 |
| 1968.00  |            |          | 0.386   | 0.136  |        |               |       |       |       |       |       | 2.943 |
| 1969.00  |            |          | 0.917   | 0.237  |        |               |       |       |       |       |       |       |
| 1970.00  |            |          | 0.433   | 0.529  |        |               |       |       |       |       |       | 0.248 |
| 1971.00  |            |          |         | 0.193  |        |               |       |       |       |       |       |       |
| 1972.00  |            |          |         | 0.427  | 0.446  |               |       |       |       |       |       |       |
| 1973.00 0.000 0.220 0.220 0.354 0.451 0.639 0.510 0.327 0.462 0.366 0.760 0.475 0.598 1974.00 0.013 0.576 0.184 0.369 0.315 0.403 0.462 0.366 0.760 0.475 0.599 1975.00 0.014 0.3036 0.355 0.397 0.428 0.576 0.433 0.370 0.436 0.668 0.416 0.383 1976.00 0.000 0.365 0.338 0.406 0.398 0.417 0.370 0.436 0.668 0.416 0.383 1976.00 0.000 0.337 0.364 0.725 0.639 0.586 0.537 0.439 0.477 0.539 0.540 1977.00 0.000 0.337 0.364 0.725 0.639 0.586 0.537 0.439 0.477 0.539 0.540 1977.00 0.000 0.333 0.400 0.248 1.275 0.978 0.887 0.759 0.757 0.838 0.324 1978.00 0.029 0.133 0.140 0.248 1.275 0.978 0.887 0.759 0.757 0.838 0.324 1978.00 0.002 0.038 0.133 0.350 0.225 0.183 0.470 0.736 0.926 0.435 0.776 1980.00 0.001 0.002 0.038 0.133 0.350 0.225 0.183 0.470 0.736 0.926 0.435 0.776 1982.00 0.002 0.038 0.133 0.350 0.225 0.662 0.451 0.145 0.565 0.494 0.413 0.229 1981.00 0.000 0.092 0.215 0.251 0.662 0.451 0.145 0.565 0.494 0.413 0.229 1983.00 0.001 0.119 0.176 0.529 0.220 0.468 0.913 0.487 0.222 0.655 0.124 1983.00 0.001 0.119 0.176 0.529 0.220 0.468 0.913 0.487 0.222 0.655 0.124 1983.00 0.000 0.030 0.218 0.428 0.710 0.327 0.302 0.852 1.195 0.483 3.753 1984.00 0.000 0.030 0.218 0.428 0.710 0.327 0.302 0.852 1.195 0.483 3.753 1986.00 0.005 0.660 0.151 0.459 0.560 0.459 0.346 0.448 0.627 0.445 0.168 1985.00 0.005 0.660 0.151 0.459 0.560 0.459 0.346 0.448 0.627 0.445 0.168 1985.00 0.005 0.660 0.151 0.459 0.560 0.459 0.346 0.448 0.627 0.445 0.168 1985.00 0.000 0.154 0.218 0.429 0.398 0.381 0.228 0.359 0.171 0.344 0.163 1981.00 0.000 0.148 0.185 0.415 0.421 0.390 0.390 0.381 0.226 0.581 0.581 0.583 0.395 0.517 0.300 1990.00 0.000 0.148 0.185 0.415 0.421 0.430 0.581 0.583 0.395 0.517 0.300 1990.00 0.000 0.148 0.185 0.415 0.421 0.430 0.581 0.543 0.395 0.517 0.300 1990.00 0.000 0.148 0.185 0.415 0.421 0.430 0.581 0.543 0.395 0.410 0.959 0.000 0.000 0.148 0.185 0.415 0.421 0.430 0.581 0.543 0.395 0.517 0.300 1990.00 0.000 0.152 0.576 0.429 0.586 0.550 0.550 0.709 0.906 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.0 |            |          |         | 0.126  | 0.739  |               |       |       |       |       |       |       |
| 1974.00  |            |          |         |        | 0.354  |               |       |       |       |       |       | 0.958 |
| 1975.00  |            |          |         |        | 0.369  |               |       |       |       |       |       |       |
| 1976.00  |            |          |         |        | 0.397  | 0.428         |       |       |       |       |       |       |
| 1977.00  |            |          |         |        | 0.406  | 0.398         |       |       |       |       |       |       |
| 1977.00  |            |          |         |        |        | 0.639         |       |       |       |       |       |       |
| 1978.00  |            |          |         |        |        |               | 0.978 |       |       |       |       |       |
| 1990.00         0.002         0.038         0.133         0.350         0.225         0.470         0.736         0.494         0.413         0.129           1981.00         0.000         0.092         0.215         0.251         0.662         0.451         0.145         0.565         0.494         0.413         0.129           1982.00         0.002         0.086         0.190         0.140         0.403         0.767         0.370         0.180         0.604         0.708         0.077           1983.00         0.001         0.119         0.176         0.529         0.220         0.468         0.913         0.487         0.222         0.655         0.124           1984.00         0.000         0.030         0.218         0.428         0.710         0.327         0.302         0.652         1.195         0.483         3.753           1985.00         0.005         0.060         0.151         0.459         0.560         0.459         0.346         0.448         0.627         0.445         0.168           1986.00         0.000         0.097         0.101         0.190         0.144         0.220         0.202         0.119         0.179         0.079  |            |          |         |        |        | 0.157         | 0.918 |       |       |       |       |       |
| 1981.00         0.000         0.092         0.215         0.251         0.662         0.451         0.145         0.370         0.180         0.604         0.708         0.077           1982.00         0.002         0.086         0.190         0.140         0.403         0.767         0.370         0.180         0.604         0.708         0.077           1983.00         0.001         0.119         0.176         0.529         0.220         0.468         0.913         0.487         0.222         0.655         0.124           1985.00         0.001         0.030         0.218         0.428         0.710         0.327         0.302         0.852         1.195         0.483         3.753           1986.00         0.005         0.060         0.151         0.459         0.560         0.459         0.346         0.448         0.627         0.445         0.168           1986.00         0.000         0.097         0.101         0.190         0.144         0.220         0.200         0.119         0.201         0.095           1987.00         0.000         0.154         0.218         0.315         0.398         0.381         0.228         0.359         0.171         0.344 <td></td> <td></td> <td></td> <td></td> <td></td> <td>0.225</td> <td>0.183</td> <td></td> <td></td> <td></td> <td></td> <td></td>  |            |          |         |        |        | 0.225         | 0.183 |       |       |       |       |       |
| 1982.00  |            |          |         |        |        | 0.662         | 0.451 |       |       |       |       |       |
| 1982.00         0.001         0.119         0.176         0.529         0.220         0.468         0.913         0.487         0.222         0.483         3.753           1984.00         0.000         0.030         0.218         0.428         0.710         0.327         0.302         0.852         1.195         0.483         3.753           1986.00         0.005         0.060         0.151         0.459         0.560         0.459         0.346         0.448         0.627         0.445         0.168           1986.00         0.000         0.097         0.101         0.190         0.144         0.220         0.200         0.169         0.119         0.217         0.095           1987.00         0.002         0.111         0.134         0.283         0.237         0.166         0.205         0.202         0.119         0.179         0.087           1988.00         0.000         0.154         0.218         0.315         0.398         0.381         0.228         0.359         0.171         0.344         0.163           1990.00         0.000         0.148         0.185         0.415         0.421         0.430         0.581         0.543         0.395         0.517 <td></td> <td></td> <td></td> <td></td> <td></td> <td>0.403</td> <td>0.767</td> <td>0.370</td> <td></td> <td></td> <td></td> <td></td>   |            |          |         |        |        | 0.403         | 0.767 | 0.370 |       |       |       |       |
| 1983.00         0.001         0.130         0.218         0.428         0.710         0.327         0.302         0.552         1.195         0.445         0.168           1985.00         0.005         0.060         0.151         0.459         0.560         0.459         0.346         0.448         0.627         0.445         0.168           1986.00         0.000         0.097         0.101         0.190         0.144         0.220         0.200         0.119         0.201         0.095           1987.00         0.002         0.111         0.134         0.283         0.237         0.166         0.205         0.202         0.192         0.179         0.087           1988.00         0.000         0.154         0.218         0.315         0.398         0.381         0.228         0.359         0.171         0.344         0.163           1989.00         0.000         0.148         0.170         0.177         0.204         0.265         0.204         0.145         0.231         0.232         0.160           1990.00         0.000         0.148         0.185         0.415         0.421         0.430         0.581         0.543         0.395         0.517         0.300 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>0.468</td> <td>0.913</td> <td></td> <td></td> <td></td> <td></td>  |            |          |         |        |        |               | 0.468 | 0.913 |       |       |       |       |
| 1984.00         0.005         0.060         0.151         0.459         0.560         0.459         0.346         0.448         0.627         0.445         0.065         0.151         0.459         0.560         0.202         0.200         0.169         0.119         0.201         0.095           1986.00         0.000         0.021         0.134         0.283         0.237         0.166         0.205         0.202         0.172         0.344         0.163           1987.00         0.000         0.154         0.218         0.315         0.398         0.381         0.228         0.359         0.171         0.344         0.163           1989.00         0.000         0.154         0.218         0.315         0.398         0.381         0.228         0.359         0.171         0.344         0.163           1990.00         0.000         0.148         0.185         0.415         0.421         0.430         0.581         0.543         0.395         0.517         0.300           1991.00         0.000         0.147         0.228         0.429         0.392         0.348         0.397         0.486         0.422         0.421         0.631           1991.00         0.000 <td></td> <td></td> <td></td> <td></td> <td></td> <td>0.710</td> <td>0.327</td> <td>0.302</td> <td></td> <td></td> <td></td> <td></td>   |            |          |         |        |        | 0.710         | 0.327 | 0.302 |       |       |       |       |
| 1985.00         0.000         0.097         0.101         0.190         0.144         0.220         0.200         0.169         0.119         0.087           1987.00         0.002         0.111         0.134         0.283         0.237         0.166         0.205         0.202         0.192         0.179         0.087           1987.00         0.000         0.154         0.218         0.315         0.398         0.381         0.228         0.359         0.171         0.344         0.163           1989.00         0.000         0.154         0.218         0.177         0.204         0.265         0.204         0.145         0.231         0.232         0.160           1990.00         0.000         0.148         0.185         0.415         0.421         0.430         0.581         0.543         0.395         0.517         0.300           1991.00         0.000         0.117         0.218         0.429         0.392         0.348         0.397         0.486         0.422         0.421         0.630           1992.00         0.000         0.492         0.231         0.638         0.597         0.688         0.550         0.539         0.815         0.663         0.691 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>0.459</td> <td>0.346</td> <td></td> <td></td> <td></td> <td></td>  |            |          |         |        |        |               | 0.459 | 0.346 |       |       |       |       |
| 1986.00         0.000         0.111         0.134         0.283         0.237         0.166         0.205         0.202         0.192         0.179         0.041           1988.00         0.000         0.154         0.218         0.315         0.398         0.381         0.228         0.359         0.171         0.344         0.163           1989.00         0.000         0.103         0.170         0.177         0.204         0.265         0.204         0.145         0.231         0.232         0.160           1990.00         0.000         0.148         0.185         0.415         0.421         0.430         0.581         0.543         0.395         0.517         0.300           1991.00         0.000         0.148         0.185         0.429         0.392         0.348         0.397         0.486         0.422         0.421         0.630           1992.00         0.000         0.492         0.231         0.638         0.597         0.688         0.550         0.539         0.815         0.663         0.691           1992.00         0.000         0.492         0.231         0.686         0.590         0.773         0.773         0.773         0.773         0.773 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>0.220</td> <td>0.200</td> <td></td> <td></td> <td></td> <td></td>  |            |          |         |        |        |               | 0.220 | 0.200 |       |       |       |       |
| 1987.00         0.002         0.1154         0.218         0.315         0.398         0.381         0.228         0.359         0.171         0.344         0.163           1988.00         0.000         0.154         0.217         0.204         0.265         0.204         0.145         0.231         0.232         0.160           1990.00         0.000         0.148         0.185         0.421         0.430         0.581         0.543         0.395         0.517         0.300           1990.00         0.000         0.148         0.185         0.421         0.430         0.581         0.543         0.395         0.517         0.300           1991.00         0.000         0.117         0.218         0.429         0.392         0.348         0.397         0.486         0.422         0.421         0.630           1992.00         0.000         0.492         0.231         0.638         0.597         0.688         0.550         0.539         0.815         0.663         0.691           1992.00         0.000         0.133         0.226         0.619         0.686         0.759         0.779         0.810         0.773         0.773         0.773         0.773         0.773 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>0.205</td> <td></td> <td></td> <td></td> <td></td>  |            |          |         |        |        |               |       | 0.205 |       |       |       |       |
| 1988.00         0.000         0.154         0.2170         0.177         0.204         0.265         0.204         0.145         0.231         0.232         0.300           1989.00         0.000         0.148         0.185         0.415         0.421         0.430         0.581         0.543         0.395         0.517         0.300           1991.00         0.000         0.117         0.218         0.429         0.392         0.348         0.397         0.486         0.422         0.421         0.630           1992.00         0.000         0.492         0.231         0.638         0.597         0.686         0.550         0.539         0.815         0.663         0.691           1993.00         0.000         0.432         0.231         0.686         0.759         0.779         0.810         0.773         0.773         0.273           1993.00         0.000         0.133         0.226         0.619         0.686         0.759         0.779         0.810         0.773         0.773         0.273           1994.00         0.000         0.087         0.389         0.476         0.999         1.089         1.320         1.001         0.959         1.126         0.440 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>0.228</td> <td>0.359</td> <td></td> <td></td> <td></td>   |            |          |         |        |        |               |       | 0.228 | 0.359 |       |       |       |
| 1989,00         0.000         0.148         0.185         0.415         0.421         0.430         0.581         0.543         0.395         0.421         0.630           1991,00         0.000         0.117         0.218         0.429         0.392         0.348         0.397         0.486         0.422         0.421         0.630           1991,00         0.000         0.492         0.231         0.638         0.597         0.686         0.550         0.539         0.815         0.663         0.691           1992,00         0.000         0.133         0.226         0.619         0.686         0.759         0.779         0.810         0.773         0.773         0.273           1993,00         0.000         0.133         0.268         0.611         0.709         1.089         1.320         1.001         0.959         1.126         0.440           1995,00         0.002         0.191         0.268         0.611         0.709         1.037         1.315         0.929         0.906         1.098         0.142           1996,00         0.000         0.050         0.089         0.573         0.691         0.860         0.824         0.696         0.727         0.822 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>0.204</td> <td>0.145</td> <td></td> <td></td> <td></td>  |            |          |         |        |        |               |       | 0.204 | 0.145 |       |       |       |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$   | 1989.00    |          |         |        |        |               | 0.430 | 0.581 | 0.543 |       |       |       |
| 1991.00  |            |          |         |        |        |               |       | 0.397 | 0.486 |       |       |       |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$   | 1991.00    |          |         |        |        |               |       | 0.550 | 0.539 |       |       |       |
| 1993.00  | 1992.00    |          |         |        |        |               |       | 0.779 | 0.810 |       |       |       |
| 1994.00  | 1993.00    |          |         |        |        |               |       |       | 1.001 | 0.959 |       |       |
| 1995.00  | 1994.00    | 0.000    |         |        |        |               |       |       | 0.929 | 0.906 | 1.098 |       |
| 1996.00  | 1995.00    | 0.002    |         |        |        |               |       |       |       | 0.727 |       |       |
| 1997.00  | 1996.00    | 0.000    | 0.050   |        |        |               |       |       |       | 0.407 | 0.608 |       |
| 1998.00  |            | 0.000    | 0.087   |        |        | in the second |       |       |       | 2.597 | 1.990 | 0.031 |
| 1999.00 0.002 0.280 0.573 0.513 0.844 0.592 2.328 2.468 3.009 1.646 0.003 2000.00 0.001 0.338 0.306 0.614 1.138 1.358 2.328 2.468 3.009 1.646 0.003 2001.00 0.000 0.152 0.576 0.402 0.853 1.097 2.203 3.121 2.321 1.451 0.001 2002.00 0.008 0.358 0.313 0.947 1.527 1.409 3.114 3.976 1.920 1.920 0.001 2003.00 0.000 0.390 0.889 0.732 2.053 1.459 2.904 2.285 2.853 0.000 0.000 2004.00 0.006 0.368 0.537 1.122 2.263 1.639 3.435 4.353 2.232 2.084 0.000 2004.00 0.006 0.368 0.537 1.122 2.263 1.639 3.435 4.353 2.232 2.084 0.000  |            | 0.000    | 0.354   |        |        |               |       |       |       |       | 0.988 |       |
| 2000.00 0.001 0.338 0.306 0.614 1.138 1.395 2.323 3.121 2.321 1.451 0.001 2001.00 0.000 0.152 0.576 0.402 0.853 1.097 2.203 3.121 2.321 1.451 0.001 2002.00 0.008 0.358 0.313 0.947 1.527 1.409 3.114 3.976 1.920 1.920 0.001 2003.00 0.000 0.350 0.889 0.732 2.053 1.459 2.904 2.285 2.853 0.000 0.000 2004.00 0.006 0.368 0.537 1.122 2.263 1.639 3.435 4.353 2.232 2.084 0.000 2004.00 0.006 0.368 0.537 1.122 2.263 1.639 3.435 0.858 0.858 0.858 0.858 0.000  |            |          |         |        |        |               |       |       |       |       |       | 0.003 |
| 2001.00 0.000 0.152 0.576 0.402 0.853 1.097 2.205 3.114 3.976 1.920 1.920 0.001 2002.00 0.008 0.358 0.313 0.947 1.527 1.409 3.114 3.976 1.920 1.920 0.001 2003.00 0.000 0.390 0.889 0.732 2.053 1.459 2.904 2.285 2.853 0.000 0.000 2004.00 0.006 0.368 0.537 1.122 2.263 1.639 3.435 4.353 2.232 2.084 0.000 2004.00 0.006 0.368 0.537 1.122 2.263 1.639 3.435 4.353 2.232 2.084 0.000  |            |          |         |        |        |               |       |       |       |       |       | 0.001 |
| 2002.00 0.008 0.358 0.313 0.947 1.527 1.409 3.114 2.205 2.853 0.000 0.000 2003.00 0.000 0.390 0.889 0.732 2.053 1.459 2.904 2.285 2.853 0.000 0.000 2004.00 0.006 0.368 0.537 1.122 2.263 1.639 3.435 4.353 2.232 2.084 0.000 2004.00 0.006 0.368 0.537 1.122 2.263 1.639 3.435 4.353 2.232 2.084 0.000  |            |          |         | 0.576  |        |               |       |       |       |       |       | 0.001 |
| 2003.00 0.000 0.390 0.889 0.732 2.053 1.403 2.303 2.232 2.084 0.000 2004.00 0.006 0.368 0.537 1.122 2.263 1.639 3.435 4.353 2.232 2.084 0.000 2004.00 0.006 0.368 0.537 1.122 2.263 1.639 0.858 0.858 0.858 0.858 0.858 0.858  |            |          |         | 0.313  |        |               |       |       |       |       |       | 0.000 |
| 2004.00 0.006 0.368 0.537 1.122 2.263 1.639 3.433 4.332 0.858 0.858 0.858 0.000  |            |          |         |        | 0.732  |               |       |       |       |       |       | 0.000 |
| 2004.00 0.000 0.000 0.000 0.000 0.000  |            |          |         |        |        |               |       |       |       |       |       | 0.000 |
|  |            |          |         |        | 0.60   | 1 0.772       | 0.858 | 0.000 | 0.000 | 0,000 |       |       |

APPROXIMATE STATISTICS ASSUMING LINEARITY NEAR SOLUTION

ORTHOGONALITY OFFSET...... 0.001200
MEAN SQUARE RESIDUALS ..... 0.590637

| Parameter<br>N[2006 7]<br>q ID#[3]<br>q ID#[4]<br>q ID#[5]<br>q ID#[6]<br>q ID#[7] | Est.<br>2.81E3<br>3.76E0<br>1.04E1<br>1.18E1<br>3.09E1<br>3.46E1 | 1.32E3<br>1.13E0<br>3.12E0<br>3.55E0<br>9.27E0<br>1.04E1 | Rel. Err.<br>0.471<br>0.301<br>0.300<br>0.300<br>0.300<br>0.300 | Bias<br>2.66E2<br>1.58Eýl<br>4.44Eýl<br>5.13Eýl<br>1.34E0<br>1.50E0 | 0.095<br>0.042<br>0.043<br>0.043<br>0.043<br>0.043 |
|--|--|--|---|---|--|
|--|--|--|---|---|--|

VPA using analytical bias adjusted parameters (linear scale)

| Population Numbers   | 3     | 4      | 5                          | 6                |        | 8 | 9                                       | 10                   | 11+<br>500                  |
|--|-------|--------|----------------------------|------------------|--------|---|---|----------------------|-----------------------------|
| 1965.00 3503534 3848688 9<br>1966.00 2737874 2624572 21<br>1967.00 6078739 2102325 13<br>1968.00 1286168 4325977 11<br>1969.00 1754254 904620 14 | 77169 | 378701 | 863223<br>575717<br>889042 | 418512<br>372334 | 200109 |   | 1354<br>2855<br>21740<br>30056<br>32938 | 1060<br>836<br>17430 | 707<br>1253<br>1311<br>9244 |

Appendix C. VPA formulation and model output with German Bank acoustic index (ages 4-8).

| 1570 00   | 2204007  | 1338027   | 480252  | 682955  | 499558  | 429512  | 281595  | 139599  | 47575   | 21258   | 13377  |
|---|--|---|---|---|---|---|---|---|---|---|--|
|   |  |   |   |   |   |   |   |   |   |   |  |
| 1971.00   | 7460417  | 1258574   | 579796  | 324285  | 303152  | 228973  | 243661  | 130382  | 77266   | 19947   | 19640  |
| 1972.00   | 1138007  | 6028985   | 667899  | 309749  | 169889  | 146502  | 119687  | 115682  | 61966   | 30575   | 20551  |
|   |  |   |   | 481941  | 121063  | 70132   | 52761   | 54102   | 51165   | 27434   | 19153  |
| 1973.00   |  |   | 4350854   |   |   |   |   |   |   |   |  |
| 1974.00   | 1625829  | 1912063   | 612115  | 2859195   | 277069  | 63139   | 30305   | 23481   | 26162   | 20577   | 15921  |
| 1975.00   |  | 1314489   | 880008  | 416859  | 1619372   | 165491  | 34561   | 15639   | 13330   | 10013   | 15485  |
|   |  |   |   |   |   |   | 76167   | 17278   | 8846  | 6633  | 11863  |
| 1976.00   | 721820   | 199458  | 790742  | 505119  | 229479  | 864256  |   |   |   |   |  |
| 1977.00   | 4140081  | 590760  | 113384  | 461878  | 275572  | 126138  | 466414  | 43093   | 9149  | 3712  | 10203  |
| 1978.00   |  |   | 34540€  | 64483   | 183136  | 119041  | 57492   | 223170  | 22748   | 4650  | 6640   |
|   |  |   |   |   |   |   |   |   |   |   |  |
| 1979.00   | 449147   | 1070508   | 2428553   | 245946  | 41184   | 41880   | 36645   | 19392   | 85497   | 8737  | 5577   |
| 1980.00   | 1570597  | 367422  | 710839  | 1762596   | 152252  | 28826   | 13695   | 13722   | 5372  | 33069   | 5530   |
|   |  |   |   |   |   | 99518   | 19663   | 7007  | 5380  | 1742  | 19616  |
|   | 1669558  |   | 289532  |   | 1017308   |   |   |   |   |   |  |
| 1982.00   | 2302838  | 1366918   | 959467  | 191249  | 324646  | 429491  | 51910   | 13919   | 3261  | 2687  | 15067  |
|   |  | 1882162   | 1027010   | 649785  | 136177  | 177675  | 163382  | 29368   | 9523  | 1459  | 12505  |
|   |  |   |   |   |   |   |   |   |   | 6242  | 9665   |
|   |  | 3334258   |   | 705445  | 313499  | 89457   | 91079   | 53687   | 14768   |   |  |
| 1985.00   | 1831381  | 4115990   | 2650014   | 900962  | 376337  | 126231  | 52832   | 55107   | 18746   | 3661  | 3339   |
|   |  | 1491259   |   |   | 466203  | 175953  | 65334   | 30614   | 28818   | 8199  | 4231   |
|   |  |   |   |   |   |   |   |   |   |   |  |
| 1987.00   | 1397308  | 867547  | 1107935   | 2350078   | 1263651   | 330385  | 115618  | 43794   | 21173   | 20942   | 8641   |
| 1988.00   | 1401917  | 1141942   | 635504  | 793142  | 1449860   | 816306  | 229118  | 77122   | 29291   | 14308   | 20824  |
|   |  |   |   |   |   | 797404  | 456413  | 149310  | 44098   | 20211   | 22791  |
|   | 1744614  |   | 801233  | 418412  | 474051  |   |   |   |   |   |  |
| 1990.00   | 1185719  | 1428362   | 847830  | 553220  | 286868  | 316593  | 500847  | 304643  | 105751  | 28662   | 29020  |
| 1991.00   | 579910   | 970785  | 1008567   | 576914  | 299026  | 154203  | 168557  | 229416  | 144866  | 58343   | 31602  |
|   |  |   |   |   |   | 165457  | 89111   | 92791   | 115487  | 77777   | 45143  |
| 1992.00   | 824078   | 474790  | 707394  | 664216  | 307618  |   |   |   |   |   |  |
| 1993.00   | 1669807  | 674690  | 237693  | 459804  | 287340  | 138696  | 68056   | 42113   | 44305   | 41843   | 51315  |
| 1994.00   |  | 1366972   | 483523  | 155220  | 202812  | 118503  | 53150   | 25557   | 15331   | 16747   | 47773  |
|   |  |   |   |   |   |   |   |   | 7693  | 4810  | 29629  |
| 1995.00   |  |   | 1025476   | 268195  | 78955   | 61164   | 32668   | 11627   |   |   |  |
| 1996.00   | 913353   | 842843  | 485628  | 641941  | 119202  | 31801   | 17745   | 7177  | 3759  | 2545  | 22358  |
| 1997.00   |  | 747790  | 656218  | 363580  | 296445  | 48890   | 11017   | 6373  | 2929  | 1487  | 17773  |
|   |  |   |   |   |   |   |   |   | 1984  |   |  |
| 1998.00   | 619517   | 974132  | 561219  | 458527  | 227441  | 125595  | 23094   | 4439  |   | 1596  | 14426  |
| 1999.00   | 1702100  | 507094  | 559661  | 403312  | 250907  | 99434   | 17222   | 1005  | 282   | 121   | 11630  |
|   |  |   | 313667  | 258412  | 197783  | 88303   | 30480   | 5174  | 279   | 44  | 9547   |
| 2000.00   |  | 1391128   |   |   |   |   |   |   |   |   |  |
| 2001.00   | 1345106  | 572061  | 811919  | 189106  | 114493  | 51893   | 18599   | 2432  | 359   | 11  | 7803   |
| 2002.00   | 1995355  | 1101234   | 402256  | 373696  | 103522  | 39928   | 14187   | 1682  | 88  | 29  | 6387   |
|   | 1342461  |   | 628886  | 240736  | 118619  | 18408   | 7985  | 516   | 26  | 11  | 5230   |
|   |  |   |   |   |   |   |   |   |   |   |  |
| 2004.00   | 561550   | 1098699   | 889632  | 209925  | 94595   | 12372   | 3500  | 358   | 43  | 1   | 4291   |
| 2005.00   | 1000000  | 473295  | 611752  | 417166  | 54332   | 7765  | 1902  | 89  | 4   | 4   | 3513   |
|   |  |   |   | 347187  | 179860  | 19503   | 2543  | 623   | 29  | 1   | 2877   |
|   |  |   |   |   |   |   |   |   |   |   |  |
| 2006.00   | 1000000  | 010003  | 322624  | 241701  | 113000  | 20000   |   |   |   |   |  |
| 2006.00   | 1000000  | 010003  | 322024  | 24/10/  | 179000  | 20000   |   |   |   |   |  |
|   |  |   | 322024  | 34/10/  | 173000  | 1,,,,,  |   |   |   |   |  |
| 2006.00<br>Fishing M  | Mortality  | ,   |   |   |   |   |   |   |   | 10  | 11+  |
| Fishing M   | Mortality  | 4 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11+  |
|   | Mortality  | ,   |   |   |   |   |   | 0.163   | 0.045   | 0.106   | 0.002  |
| Fishing M   | Mortality<br>1<br>0.089  | 0.370   | 0.039   | 0.219   | 5<br>0.172  | 6<br>0.135  | 0.043   | 0.163   | 9   |   |  |
| Fishing N<br>1965.00<br>1966.00   | 0.089  | 0.370<br>0.480  | 0.039<br>0.257  | 4<br>0.219<br>0.109   | 5<br>0.172<br>0.524   | 6<br>0.135<br>0.236   | 7<br>0.043<br>0.264   | 8<br>0.163<br>0.277   | 9<br>0.045<br>1.028   | 0.106   | 0.002  |
| Fishing M<br>1965.00<br>1966.00<br>1967.00  | 0.089<br>0.064<br>0.140  | 2<br>0.370<br>0.480<br>0.386  | 0.039<br>0.257<br>0.136   | 0.219<br>0.109<br>0.239   | 5<br>0.172<br>0.524<br>0.236  | 0.135<br>0.236<br>0.538   | 7<br>0.043<br>0.264<br>0.525  | 8<br>0.163<br>0.277<br>0.127  | 9<br>0.045<br>1.028<br>0.021  | 0.106<br>0.252<br>0.490   | 0.002<br>0.002<br>0.139  |
| Fishing N<br>1965.00<br>1966.00   | 0.089  | 0.370<br>0.480  | 0.039<br>0.257  | 4<br>0.219<br>0.109   | 5<br>0.172<br>0.524   | 6<br>0.135<br>0.236   | 7<br>0.043<br>0.264   | 8<br>0.163<br>0.277   | 9<br>0.045<br>1.028   | 0.106<br>0.252<br>0.490<br>0.440  | 0.002<br>0.002<br>0.139<br>2.943   |
| Fishing N<br>1965.00<br>1966.00<br>1967.00<br>1968.00   | 4ortality<br>0.089<br>0.064<br>0.140<br>0.152  | 2<br>0.370<br>0.480<br>0.386<br>0.917   | 3<br>0.039<br>0.257<br>0.136<br>0.237   | 4<br>0.219<br>0.109<br>0.239<br>0.101   | 5<br>0.172<br>0.524<br>0.236<br>0.443   | 0.135<br>0.236<br>0.538<br>0.243  | 7<br>0.043<br>0.264<br>0.525<br>0.681   | 8<br>0.163<br>0.277<br>0.127<br>0.625   | 9<br>0.045<br>1.028<br>0.021  | 0.106<br>0.252<br>0.490   | 0.002<br>0.002<br>0.139  |
| Fishing N<br>1965.00<br>1966.00<br>1967.00<br>1968.00<br>1969.00  | 4ortality<br>0.089<br>0.064<br>0.140<br>0.152<br>0.071   | 2<br>0.370<br>0.480<br>0.386<br>0.917<br>0.433  | 3<br>0.039<br>0.257<br>0.136<br>0.237<br>0.529  | 4<br>0.219<br>0.109<br>0.239<br>0.101<br>0.214  | 5<br>0.172<br>0.524<br>0.236<br>0.443<br>0.293  | 0.135<br>0.236<br>0.538<br>0.243<br>0.307   | 7<br>0.043<br>0.264<br>0.525<br>0.681<br>0.338  | 8<br>0.163<br>0.277<br>0.127<br>0.625<br>0.355  | 9<br>0.045<br>1.028<br>0.021<br>0.819<br>0.238  | 0.106<br>0.252<br>0.490<br>0.440<br>0.318   | 0.002<br>0.002<br>0.139<br>2.943<br>0.090  |
| Fishing N<br>1965.00<br>1966.00<br>1967.00<br>1968.00<br>1969.00<br>1970.00   | 4ortalit;<br>0.089<br>0.064<br>0.140<br>0.152<br>0.071<br>0.405  | 2<br>0.370<br>0.480<br>0.386<br>0.917<br>0.433<br>0.636   | 3<br>0.039<br>0.257<br>0.136<br>0.237<br>0.529<br>0.193   | 0.219<br>0.109<br>0.239<br>0.101<br>0.214<br>0.612  | 5<br>0.172<br>0.524<br>0.236<br>0.443<br>0.293<br>0.580   | 6<br>0.135<br>0.236<br>0.538<br>0.243<br>0.307<br>0.367   | 7<br>0.043<br>0.264<br>0.525<br>0.681<br>0.338<br>0.570   | 8<br>0.163<br>0.277<br>0.127<br>0.625<br>0.355<br>0.392   | 9<br>0.045<br>1.028<br>0.021<br>0.819<br>0.238<br>0.669   | 0.106<br>0.252<br>0.490<br>0.440<br>0.318<br>0.450  | 0.002<br>0.002<br>0.139<br>2.943<br>0.090<br>0.248   |
| Fishing N<br>1965.00<br>1966.00<br>1967.00<br>1968.00<br>1969.00  | 4ortality<br>0.089<br>0.064<br>0.140<br>0.152<br>0.071   | 2<br>0.370<br>0.480<br>0.386<br>0.917<br>0.433  | 3<br>0.039<br>0.257<br>0.136<br>0.237<br>0.529  | 4<br>0.219<br>0.109<br>0.239<br>0.101<br>0.214  | 5<br>0.172<br>0.524<br>0.236<br>0.443<br>0.293  | 0.135<br>0.236<br>0.538<br>0.243<br>0.307   | 7<br>0.043<br>0.264<br>0.525<br>0.681<br>0.338  | 8<br>0.163<br>0.277<br>0.127<br>0.625<br>0.355  | 0.045<br>1.028<br>0.021<br>0.819<br>0.238<br>0.669<br>0.727   | 0.106<br>0.252<br>0.490<br>0.440<br>0.318<br>0.450<br>0.533   | 0.002<br>0.002<br>0.139<br>2.943<br>0.090<br>0.248<br>0.383  |
| Fishing N<br>1965.00<br>1966.00<br>1967.00<br>1968.00<br>1969.00<br>1970.00<br>1971.00  | Mortality<br>1<br>0.089<br>0.064<br>0.140<br>0.152<br>0.071<br>0.405<br>0.013  | 2<br>0.370<br>0.480<br>0.386<br>0.917<br>0.433<br>0.636<br>0.434  | 3<br>0.039<br>0.257<br>0.136<br>0.237<br>0.529<br>0.193<br>0.427  | 4<br>0.219<br>0.109<br>0.239<br>0.101<br>0.214<br>0.612<br>0.446  | 5<br>0.172<br>0.524<br>0.236<br>0.443<br>0.293<br>0.580<br>0.527  | 0.135<br>0.236<br>0.538<br>0.243<br>0.307<br>0.367<br>0.449   | 7<br>0.043<br>0.264<br>0.525<br>0.681<br>0.338<br>0.570<br>0.545  | 0.163<br>0.277<br>0.127<br>0.625<br>0.355<br>0.392<br>0.544   | 0.045<br>1.028<br>0.021<br>0.819<br>0.238<br>0.669<br>0.727   | 0.106<br>0.252<br>0.490<br>0.440<br>0.318<br>0.450  | 0.002<br>0.002<br>0.139<br>2.943<br>0.090<br>0.248   |
| Fishing N<br>1965.00<br>1966.00<br>1967.00<br>1968.00<br>1969.00<br>1970.00<br>1971.00  | 1<br>0.089<br>0.064<br>0.140<br>0.152<br>0.071<br>0.405<br>0.013<br>0.000  | 2<br>0.370<br>0.480<br>0.386<br>0.917<br>0.433<br>0.636<br>0.434<br>0.126   | 3<br>0.039<br>0.257<br>0.136<br>0.237<br>0.529<br>0.193<br>0.427<br>0.126   | 4<br>0.219<br>0.109<br>0.239<br>0.101<br>0.214<br>0.612<br>0.446<br>0.739   | 5<br>0.172<br>0.524<br>0.236<br>0.443<br>0.293<br>0.580<br>0.527<br>0.685   | 6<br>0.135<br>0.236<br>0.538<br>0.243<br>0.307<br>0.367<br>0.449<br>0.821   | 7<br>0.043<br>0.264<br>0.525<br>0.681<br>0.338<br>0.570<br>0.545  | 8<br>0.163<br>0.277<br>0.127<br>0.625<br>0.355<br>0.355<br>0.392<br>0.544<br>0.616  | 9<br>0.045<br>1.028<br>0.021<br>0.819<br>0.238<br>0.669<br>0.727<br>0.615   | 0.106<br>0.252<br>0.490<br>0.440<br>0.318<br>0.450<br>0.533<br>0.678  | 0.002<br>0.002<br>0.139<br>2.943<br>0.090<br>0.248<br>0.383<br>0.960   |
| Fishing N<br>1965.00<br>1966.00<br>1967.00<br>1968.00<br>1970.00<br>1971.00<br>1972.00<br>1973.00   | fortality<br>0.089<br>0.064<br>0.140<br>0.152<br>0.071<br>0.405<br>0.013<br>0.000<br>0.000   | 2<br>0.370<br>0.480<br>0.386<br>0.917<br>0.433<br>0.636<br>0.434<br>0.126<br>0.220  | 3<br>0.039<br>0.257<br>0.136<br>0.237<br>0.529<br>0.193<br>0.427<br>0.126<br>0.220  | 4<br>0.219<br>0.109<br>0.239<br>0.101<br>0.214<br>0.612<br>0.446<br>0.739<br>0.354  | 5<br>0.172<br>0.524<br>0.236<br>0.443<br>0.293<br>0.580<br>0.587<br>0.685<br>0.451  | 6<br>0.135<br>0.236<br>0.538<br>0.243<br>0.307<br>0.367<br>0.449<br>0.821<br>0.639  | 7<br>0.043<br>0.264<br>0.525<br>0.681<br>0.338<br>0.570<br>0.545<br>0.594<br>0.610  | 8<br>0.163<br>0.277<br>0.127<br>0.625<br>0.355<br>0.392<br>0.544<br>0.616<br>0.527  | 9<br>0.045<br>1.028<br>0.021<br>0.819<br>0.238<br>0.669<br>0.727<br>0.615<br>0.711  | 0.106<br>0.252<br>0.490<br>0.440<br>0.318<br>0.450<br>0.533<br>0.678<br>0.622   | 0.002<br>0.002<br>0.139<br>2.943<br>0.090<br>0.248<br>0.383<br>0.960<br>1.402  |
| Fishing N<br>1965.00<br>1966.00<br>1967.00<br>1968.00<br>1969.00<br>1970.00<br>1971.00  | 1<br>0.089<br>0.064<br>0.140<br>0.152<br>0.071<br>0.405<br>0.013<br>0.000  | 2<br>0.370<br>0.480<br>0.386<br>0.917<br>0.433<br>0.636<br>0.434<br>0.126   | 3<br>0.039<br>0.257<br>0.136<br>0.237<br>0.529<br>0.193<br>0.427<br>0.126   | 4<br>0.219<br>0.109<br>0.239<br>0.101<br>0.214<br>0.612<br>0.446<br>0.739   | 5<br>0.172<br>0.524<br>0.236<br>0.443<br>0.293<br>0.580<br>0.527<br>0.685   | 6<br>0.135<br>0.236<br>0.538<br>0.243<br>0.307<br>0.367<br>0.449<br>0.821<br>0.639<br>0.403   | 7<br>0.043<br>0.264<br>0.525<br>0.681<br>0.338<br>0.570<br>0.545<br>0.545<br>0.610<br>0.462   | 8<br>0.163<br>0.277<br>0.127<br>0.625<br>0.355<br>0.392<br>0.544<br>0.616<br>0.527<br>0.366   | 9<br>0.045<br>1.028<br>0.021<br>0.819<br>0.238<br>0.669<br>0.727<br>0.615<br>0.711  | 0.106<br>0.252<br>0.490<br>0.440<br>0.318<br>0.450<br>0.533<br>0.678<br>0.622<br>0.475  | 0.002<br>0.002<br>0.139<br>2.943<br>0.090<br>0.248<br>0.383<br>0.960<br>1.402<br>0.958   |
| Fishing N<br>1965.00<br>1966.00<br>1967.00<br>1968.00<br>1970.00<br>1971.00<br>1972.00<br>1973.00<br>1974.00  | fortality<br>0.089<br>0.064<br>0.140<br>0.152<br>0.071<br>0.405<br>0.013<br>0.000<br>0.000<br>0.013  | 2<br>0.370<br>0.480<br>0.386<br>0.917<br>0.433<br>0.636<br>0.434<br>0.126<br>0.220<br>0.576   | 3<br>0.039<br>0.257<br>0.136<br>0.237<br>0.529<br>0.193<br>0.427<br>0.126<br>0.220<br>0.184   | 4<br>0.219<br>0.109<br>0.239<br>0.101<br>0.214<br>0.612<br>0.446<br>0.739<br>0.354<br>0.369   | 5<br>0.172<br>0.524<br>0.236<br>0.443<br>0.293<br>0.580<br>0.527<br>0.685<br>0.451<br>0.315   | 6<br>0.135<br>0.236<br>0.538<br>0.243<br>0.307<br>0.367<br>0.449<br>0.821<br>0.639  | 7<br>0.043<br>0.264<br>0.525<br>0.681<br>0.338<br>0.570<br>0.545<br>0.594<br>0.610  | 8<br>0.163<br>0.277<br>0.127<br>0.625<br>0.355<br>0.392<br>0.544<br>0.616<br>0.527  | 9<br>0.045<br>1.028<br>0.021<br>0.819<br>0.238<br>0.669<br>0.727<br>0.615<br>0.711  | 0.106<br>0.252<br>0.490<br>0.440<br>0.318<br>0.450<br>0.533<br>0.678<br>0.622   | 0.002<br>0.002<br>0.139<br>2.943<br>0.090<br>0.248<br>0.383<br>0.960<br>1.402  |
| 1965.00<br>1966.00<br>1966.00<br>1968.00<br>1969.00<br>1970.00<br>1971.00<br>1972.00<br>1973.00<br>1974.00  | 1 0.089<br>0.064<br>0.140<br>0.152<br>0.071<br>0.405<br>0.013<br>0.000<br>0.000  | 2<br>0.370<br>0.480<br>0.386<br>0.917<br>0.433<br>0.636<br>0.434<br>0.126<br>0.220<br>0.576<br>0.308  | 3<br>0.039<br>0.257<br>0.136<br>0.237<br>0.529<br>0.193<br>0.427<br>0.126<br>0.220<br>0.184<br>0.355  | 4<br>0.219<br>0.109<br>0.239<br>0.101<br>0.214<br>0.612<br>0.446<br>0.739<br>0.354<br>0.369<br>0.397  | 5<br>0.172<br>0.524<br>0.236<br>0.443<br>0.293<br>0.580<br>0.527<br>0.685<br>0.451<br>0.315<br>0.428  | 0.135<br>0.236<br>0.538<br>0.243<br>0.307<br>0.367<br>0.449<br>0.821<br>0.639<br>0.403<br>0.576   | 7<br>0.043<br>0.264<br>0.525<br>0.681<br>0.338<br>0.570<br>0.545<br>0.594<br>0.610<br>0.462<br>0.493  | 8<br>0.163<br>0.277<br>0.127<br>0.625<br>0.355<br>0.392<br>0.544<br>0.616<br>0.527<br>0.366<br>0.370  | 9<br>0.045<br>1.028<br>0.021<br>0.819<br>0.238<br>0.669<br>0.727<br>0.615<br>0.711<br>0.760<br>0.498  | 0.106<br>0.252<br>0.490<br>0.440<br>0.318<br>0.450<br>0.533<br>0.678<br>0.622<br>0.475  | 0.002<br>0.002<br>0.139<br>2.943<br>0.090<br>0.248<br>0.383<br>0.960<br>1.402<br>0.958<br>0.579  |
| Fishing b<br>1965.00<br>1966.00<br>1967.00<br>1968.00<br>1970.00<br>1971.00<br>1973.00<br>1973.00<br>1974.00<br>1976.00   | fortality<br>1<br>0.089<br>0.064<br>0.140<br>0.152<br>0.071<br>0.405<br>0.013<br>0.000<br>0.000<br>0.013<br>0.014<br>0.000   | 2<br>0.370<br>0.480<br>0.386<br>0.917<br>0.433<br>0.636<br>0.434<br>0.126<br>0.220<br>0.576<br>0.308<br>0.365   | 3<br>0.039<br>0.257<br>0.136<br>0.237<br>0.529<br>0.193<br>0.427<br>0.126<br>0.220<br>0.184<br>4.355<br>0.338   | 4<br>0.219<br>0.109<br>0.239<br>0.101<br>0.214<br>0.612<br>0.446<br>0.739<br>0.354<br>0.369<br>0.397  | 5<br>0.172<br>0.524<br>0.236<br>0.443<br>0.293<br>0.580<br>0.527<br>0.685<br>0.451<br>0.315<br>0.428<br>0.398   | 6<br>0.135<br>0.236<br>0.538<br>0.243<br>0.307<br>0.367<br>0.449<br>0.821<br>0.639<br>0.403<br>0.576<br>0.417   | 7<br>0.043<br>0.264<br>0.525<br>0.681<br>0.338<br>0.570<br>0.545<br>0.594<br>0.610<br>0.462<br>0.493<br>0.370   | 8<br>0.163<br>0.277<br>0.127<br>0.625<br>0.355<br>0.392<br>0.544<br>0.616<br>0.527<br>0.366<br>0.370<br>0.436   | 9<br>0.045<br>1.028<br>0.021<br>0.819<br>0.238<br>0.669<br>0.727<br>0.615<br>0.711<br>0.760<br>0.498<br>0.668   | 0.106<br>0.252<br>0.490<br>0.440<br>0.318<br>0.450<br>0.533<br>0.678<br>0.622<br>0.475<br>0.545   | 0.002<br>0.002<br>0.139<br>2.943<br>0.090<br>0.248<br>0.383<br>0.960<br>1.402<br>0.958<br>0.579<br>0.383   |
| 1965.00<br>1966.00<br>1966.00<br>1968.00<br>1969.00<br>1970.00<br>1971.00<br>1972.00<br>1973.00<br>1974.00  | 1 0.089<br>0.064<br>0.140<br>0.152<br>0.071<br>0.405<br>0.013<br>0.000<br>0.000  | 2<br>0.370<br>0.480<br>0.386<br>0.917<br>0.433<br>0.636<br>0.434<br>0.126<br>0.220<br>0.576<br>0.308  | 3<br>0.039<br>0.257<br>0.136<br>0.237<br>0.529<br>0.193<br>0.427<br>0.126<br>0.220<br>0.184<br>0.355  | 4<br>0.219<br>0.109<br>0.239<br>0.101<br>0.214<br>0.612<br>0.446<br>0.739<br>0.354<br>0.369<br>0.397  | 5<br>0.172<br>0.524<br>0.236<br>0.443<br>0.293<br>0.580<br>0.527<br>0.685<br>0.451<br>0.315<br>0.428  | 6<br>0.135<br>0.236<br>0.538<br>0.243<br>0.307<br>0.367<br>0.449<br>0.821<br>0.639<br>0.403<br>0.576<br>0.417<br>0.586  | 7<br>0.043<br>0.264<br>0.525<br>0.681<br>0.338<br>0.570<br>0.545<br>0.594<br>0.610<br>0.462<br>0.493<br>0.370<br>0.537  | 8<br>0.163<br>0.277<br>0.127<br>0.625<br>0.355<br>0.392<br>0.544<br>0.616<br>0.527<br>0.366<br>0.370<br>0.436<br>0.439  | 9<br>0.045<br>1.028<br>0.021<br>0.819<br>0.238<br>0.669<br>0.727<br>0.615<br>0.711<br>0.760<br>0.498<br>0.668<br>0.477  | 0.106<br>0.252<br>0.490<br>0.440<br>0.318<br>0.450<br>0.533<br>0.678<br>0.622<br>0.475<br>0.545<br>0.416<br>0.539   | 0.002<br>0.002<br>0.139<br>2.943<br>0.090<br>0.248<br>0.383<br>0.960<br>1.402<br>0.958<br>0.579<br>6.383<br>0.540  |
| Fishing N<br>1965.00<br>1966.00<br>1967.00<br>1968.00<br>1970.00<br>1971.00<br>1972.00<br>1973.00<br>1974.00<br>1975.00<br>1975.00  | 1 0.089<br>0.064<br>0.140<br>0.152<br>0.071<br>0.405<br>0.013<br>0.000<br>0.013<br>0.014<br>0.000<br>0.000   | 2<br>0.370<br>0.480<br>0.386<br>0.917<br>0.433<br>0.636<br>0.434<br>0.126<br>0.220<br>0.576<br>0.308<br>0.365<br>0.337  | 3<br>0.039<br>0.257<br>0.136<br>0.237<br>0.529<br>0.193<br>0.427<br>0.126<br>0.220<br>0.184<br>0.355<br>0.338   | 4<br>0.219<br>0.109<br>0.239<br>0.101<br>0.214<br>0.612<br>0.446<br>0.739<br>0.354<br>0.369<br>0.397<br>0.406<br>0.725  | 5<br>0.172<br>0.524<br>0.236<br>0.443<br>0.293<br>0.580<br>0.527<br>0.685<br>0.451<br>0.315<br>0.428<br>0.398<br>0.639  | 6<br>0.135<br>0.236<br>0.538<br>0.243<br>0.307<br>0.367<br>0.449<br>0.821<br>0.639<br>0.403<br>0.576<br>0.417   | 7<br>0.043<br>0.264<br>0.525<br>0.681<br>0.338<br>0.570<br>0.545<br>0.594<br>0.610<br>0.462<br>0.493<br>0.370   | 8<br>0.163<br>0.277<br>0.127<br>0.625<br>0.355<br>0.392<br>0.544<br>0.616<br>0.527<br>0.366<br>0.370<br>0.436   | 9<br>0.045<br>1.028<br>0.021<br>0.819<br>0.238<br>0.669<br>0.727<br>0.615<br>0.711<br>0.760<br>0.498<br>0.668   | 0.106<br>0.252<br>0.490<br>0.440<br>0.318<br>0.450<br>0.533<br>0.678<br>0.622<br>0.475<br>0.545   | 0.002<br>0.002<br>0.139<br>2.943<br>0.090<br>0.248<br>0.383<br>0.960<br>1.402<br>0.958<br>0.579<br>0.383   |
| 1965.00<br>1966.00<br>1967.00<br>1968.00<br>1970.00<br>1971.00<br>1972.00<br>1973.00<br>1974.00<br>1975.00<br>1976.00<br>1977.00  | 40rtalit;<br>1 0.089<br>0.064<br>0.140<br>0.152<br>0.071<br>0.405<br>0.013<br>0.000<br>0.000<br>0.013<br>0.014<br>0.000<br>0.000<br>0.029  | 2<br>0.370<br>0.480<br>0.386<br>0.917<br>0.433<br>0.636<br>0.434<br>0.126<br>0.220<br>0.576<br>0.308<br>0.365<br>0.337<br>0.133   | 3<br>0.039<br>0.257<br>0.136<br>0.237<br>0.529<br>0.193<br>0.427<br>0.126<br>0.220<br>0.184<br>0.355<br>0.338<br>0.364<br>0.140   | 4<br>0.219<br>0.109<br>0.239<br>0.101<br>0.214<br>0.612<br>0.739<br>0.354<br>0.369<br>0.397<br>0.406<br>0.725<br>0.725  | 5<br>0.172<br>0.524<br>0.236<br>0.443<br>0.293<br>0.580<br>0.527<br>0.685<br>0.451<br>0.315<br>0.428<br>0.639<br>1.275  | 0.135<br>0.236<br>0.538<br>0.243<br>0.307<br>0.367<br>0.449<br>0.821<br>0.639<br>0.403<br>0.576<br>0.417<br>0.586   | 7<br>0.043<br>0.264<br>0.525<br>0.681<br>0.338<br>0.570<br>0.545<br>0.594<br>0.610<br>0.462<br>0.493<br>0.370<br>0.537<br>0.887   | 8<br>0.163<br>0.277<br>0.127<br>0.625<br>0.355<br>0.392<br>0.544<br>0.616<br>0.527<br>0.366<br>0.370<br>0.436<br>0.439  | 9<br>0.045<br>1.028<br>0.021<br>0.819<br>0.238<br>0.669<br>0.727<br>0.615<br>0.711<br>0.760<br>0.498<br>0.668<br>0.477<br>0.757   | 0.106<br>0.252<br>0.490<br>0.440<br>0.318<br>0.450<br>0.533<br>0.678<br>0.622<br>0.475<br>0.545<br>0.545<br>0.539   | 0.002<br>0.002<br>0.139<br>2.943<br>0.090<br>0.248<br>0.383<br>0.960<br>1.402<br>0.958<br>0.579<br>0.383<br>0.540  |
| Fishing b<br>1965.00<br>1966.00<br>1966.00<br>1968.00<br>1970.00<br>1971.00<br>1973.00<br>1974.00<br>1975.00<br>1977.00<br>1977.00<br>1977.00   | 40rtality<br>0.089<br>0.064<br>0.140<br>0.152<br>0.071<br>0.405<br>0.013<br>0.000<br>0.000<br>0.013<br>0.014<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000   | 2<br>0.370<br>0.480<br>0.386<br>0.917<br>0.433<br>0.636<br>0.434<br>0.126<br>0.220<br>0.576<br>0.308<br>0.365<br>0.337<br>0.133   | 3<br>0.039<br>0.257<br>0.136<br>0.237<br>0.529<br>0.193<br>0.427<br>0.126<br>0.220<br>0.184<br>0.355<br>0.338<br>0.364<br>0.140   | 4<br>0.219<br>0.109<br>0.239<br>0.101<br>0.214<br>0.612<br>0.446<br>0.739<br>0.354<br>0.369<br>0.397<br>0.406<br>0.725<br>0.248   | 5<br>0.172<br>0.524<br>0.236<br>0.443<br>0.293<br>0.580<br>0.527<br>0.685<br>0.451<br>0.315<br>0.428<br>0.398<br>0.639<br>1.275<br>0.157  | 6<br>0.135<br>0.236<br>0.538<br>0.243<br>0.307<br>0.469<br>0.821<br>0.639<br>0.403<br>0.576<br>0.417<br>0.586<br>0.918  | 7<br>0.043<br>0.264<br>0.525<br>0.681<br>0.338<br>0.570<br>0.559<br>0.610<br>0.462<br>0.493<br>0.370<br>0.537<br>0.867<br>0.782   | 8<br>0.163<br>0.277<br>0.127<br>0.625<br>0.355<br>0.392<br>0.544<br>0.616<br>0.527<br>0.366<br>0.439<br>0.436<br>0.439  | 9<br>0.045<br>1.026<br>0.021<br>0.819<br>0.238<br>0.669<br>0.727<br>0.615<br>0.711<br>0.760<br>0.498<br>0.668<br>0.477<br>0.757   | 0.106<br>0.252<br>0.490<br>0.440<br>0.318<br>0.450<br>0.533<br>0.678<br>0.622<br>0.475<br>0.545<br>0.416<br>0.539<br>0.838  | 0.002<br>0.002<br>0.139<br>2.943<br>6.090<br>0.248<br>0.383<br>0.960<br>1.402<br>0.958<br>0.579<br>6.383<br>0.540<br>0.324<br>0.639  |
| 1965.00<br>1966.00<br>1967.00<br>1968.00<br>1970.00<br>1971.00<br>1972.00<br>1973.00<br>1974.00<br>1975.00<br>1976.00<br>1977.00  | 40rtalit;<br>1 0.089<br>0.064<br>0.140<br>0.152<br>0.071<br>0.405<br>0.013<br>0.000<br>0.000<br>0.013<br>0.014<br>0.000<br>0.000<br>0.029  | 2<br>0.370<br>0.480<br>0.386<br>0.917<br>0.433<br>0.636<br>0.434<br>0.126<br>0.220<br>0.576<br>0.308<br>0.365<br>0.337<br>0.133   | 3<br>0.039<br>0.257<br>0.136<br>0.237<br>0.529<br>0.193<br>0.427<br>0.126<br>0.220<br>0.184<br>0.355<br>0.338<br>0.364<br>0.140   | 4<br>0.219<br>0.109<br>0.239<br>0.101<br>0.214<br>0.612<br>0.446<br>0.739<br>0.354<br>0.369<br>0.397<br>0.406<br>0.725<br>0.248   | 5<br>0.172<br>0.524<br>0.236<br>0.443<br>0.293<br>0.580<br>0.527<br>0.685<br>0.451<br>0.315<br>0.428<br>0.639<br>1.275  | 0.135<br>0.236<br>0.538<br>0.243<br>0.307<br>0.367<br>0.449<br>0.821<br>0.639<br>0.403<br>0.576<br>0.417<br>0.586   | 7<br>0.043<br>0.264<br>0.525<br>0.681<br>0.338<br>0.570<br>0.545<br>0.594<br>0.610<br>0.462<br>0.493<br>0.370<br>0.537<br>0.887   | 8<br>0.163<br>0.277<br>0.127<br>0.625<br>0.355<br>0.392<br>0.544<br>0.616<br>0.527<br>0.366<br>0.439<br>0.759<br>1.084<br>0.736   | 9<br>0.045<br>1.028<br>0.021<br>0.819<br>0.238<br>0.669<br>0.727<br>0.615<br>0.711<br>0.760<br>0.498<br>0.668<br>0.477<br>0.757<br>0.755<br>0.926   | 0.106<br>0.252<br>0.490<br>0.440<br>0.318<br>0.450<br>0.533<br>0.678<br>0.622<br>0.475<br>0.545<br>0.416<br>0.539<br>0.838<br>0.838<br>0.435  | 0.002<br>0.002<br>0.139<br>2.943<br>0.090<br>0.248<br>0.383<br>0.960<br>1.402<br>0.958<br>0.579<br>0.383<br>0.540<br>0.324<br>0.639<br>0.776   |
| Fishing b<br>1965.00<br>1966.00<br>1967.00<br>1968.00<br>1970.00<br>1971.00<br>1972.00<br>1973.00<br>1974.00<br>1975.00<br>1977.00<br>1978.00<br>1978.00<br>1978.00   | 10.089<br>0.064<br>0.140<br>0.152<br>0.071<br>0.405<br>0.013<br>0.000<br>0.013<br>0.014<br>0.000<br>0.000<br>0.029<br>0.001  | 2<br>0.370<br>0.480<br>0.386<br>0.917<br>0.433<br>0.636<br>0.434<br>0.126<br>0.220<br>0.576<br>0.308<br>0.365<br>0.337<br>0.133<br>0.133  | 3<br>0.039<br>0.257<br>0.136<br>0.237<br>0.529<br>0.193<br>0.427<br>0.126<br>0.220<br>0.184<br>0.355<br>0.338<br>0.364<br>0.140<br>0.121  | 4<br>0.219<br>0.109<br>0.239<br>0.101<br>0.214<br>0.612<br>0.446<br>0.739<br>0.354<br>0.369<br>0.397<br>0.406<br>0.725<br>0.248<br>0.280<br>0.350   | 5<br>0.172<br>0.524<br>0.236<br>0.443<br>0.293<br>0.580<br>0.527<br>0.685<br>0.451<br>0.315<br>0.428<br>0.639<br>1.275<br>0.157<br>0.225  | 6<br>0.135<br>0.236<br>0.538<br>0.243<br>0.307<br>0.367<br>0.449<br>0.821<br>0.639<br>0.403<br>0.576<br>0.417<br>0.586<br>0.978<br>0.918  | 7<br>0.043<br>0.264<br>0.525<br>0.681<br>0.338<br>0.570<br>0.545<br>0.610<br>0.462<br>0.493<br>0.370<br>0.537<br>0.887<br>0.782<br>0.470  | 8<br>0.163<br>0.277<br>0.127<br>0.625<br>0.355<br>0.392<br>0.544<br>0.616<br>0.527<br>0.366<br>0.439<br>0.759<br>1.084<br>0.736   | 9<br>0.045<br>1.028<br>0.021<br>0.819<br>0.238<br>0.669<br>0.727<br>0.615<br>0.711<br>0.760<br>0.498<br>0.668<br>0.477<br>0.757<br>0.755<br>0.926   | 0.106<br>0.252<br>0.490<br>0.440<br>0.318<br>0.450<br>0.533<br>0.678<br>0.622<br>0.475<br>0.545<br>0.416<br>0.539<br>0.838<br>0.838<br>0.435  | 0.002<br>0.002<br>0.139<br>2.943<br>0.090<br>0.248<br>0.383<br>0.960<br>1.402<br>0.958<br>0.579<br>0.383<br>0.540<br>0.324<br>0.639<br>0.776   |
| Fishing N<br>1965.00<br>1966.00<br>1967.00<br>1968.00<br>1970.00<br>1971.00<br>1973.00<br>1975.00<br>1976.00<br>1977.00<br>1978.00<br>1978.00<br>1978.00  | 40rtalit;<br>1 0.089<br>0.064<br>0.140<br>0.152<br>0.071<br>0.405<br>0.013<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.0000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.0000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.0000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.0000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.0000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.0000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.0000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.0000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.0000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.0000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.0000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.0000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.0000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.0000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.0   | 2<br>0.370<br>0.480<br>0.386<br>0.917<br>0.433<br>0.636<br>0.434<br>0.126<br>0.220<br>0.576<br>0.308<br>0.365<br>0.337<br>0.133<br>0.209<br>0.038   | 3<br>0.039<br>0.257<br>0.136<br>0.237<br>0.529<br>0.193<br>0.427<br>0.126<br>0.220<br>0.184<br>0.355<br>0.338<br>0.364<br>0.140<br>0.121<br>0.123   | 4<br>0.219<br>0.109<br>0.239<br>0.101<br>0.214<br>0.612<br>0.739<br>0.354<br>0.369<br>0.397<br>0.406<br>0.725<br>0.248<br>0.280<br>0.280<br>0.251   | 5<br>0.172<br>0.524<br>0.236<br>0.443<br>0.293<br>0.580<br>0.527<br>0.685<br>0.451<br>0.315<br>0.428<br>0.398<br>0.639<br>1.275<br>0.157<br>0.157<br>0.157  | 0.135<br>0.236<br>0.538<br>0.243<br>0.307<br>0.367<br>0.449<br>0.821<br>0.639<br>0.403<br>0.576<br>0.417<br>0.586<br>0.978<br>0.918<br>0.183<br>0.451   | 7<br>0.043<br>0.264<br>0.525<br>0.681<br>0.338<br>0.570<br>0.545<br>0.594<br>0.610<br>0.462<br>0.493<br>0.370<br>0.537<br>0.887<br>0.782<br>0.470<br>0.145  | 8<br>0.163<br>0.277<br>0.127<br>0.625<br>0.355<br>0.392<br>0.544<br>0.616<br>0.370<br>0.436<br>0.439<br>0.759<br>1.084<br>0.756   | 9<br>0.045<br>1.028<br>0.021<br>0.819<br>0.238<br>0.669<br>0.727<br>0.615<br>0.711<br>0.760<br>0.498<br>0.668<br>0.477<br>0.757<br>0.757<br>0.750<br>0.926  | 0.106<br>0.252<br>0.490<br>0.440<br>0.318<br>0.450<br>0.533<br>0.678<br>0.622<br>0.475<br>0.545<br>0.416<br>0.539<br>0.838<br>0.830<br>0.435  | 0.002<br>0.002<br>0.139<br>2.943<br>0.090<br>0.248<br>0.383<br>0.960<br>1.402<br>0.958<br>0.579<br>0.383<br>0.540<br>0.324<br>0.639<br>0.324   |
| Fishing N<br>1965.00<br>1966.00<br>1966.00<br>1969.00<br>1970.00<br>1971.00<br>1972.00<br>1973.00<br>1974.00<br>1975.00<br>1977.00<br>1978.00<br>1979.00<br>1980.00<br>1981.00  | 10.089<br>0.064<br>0.140<br>0.152<br>0.071<br>0.405<br>0.013<br>0.000<br>0.013<br>0.014<br>0.000<br>0.013<br>0.014<br>0.000<br>0.013<br>0.014<br>0.000<br>0.002<br>0.001<br>0.002<br>0.002   | 2<br>0.370<br>0.480<br>0.386<br>0.917<br>0.433<br>0.636<br>0.434<br>0.126<br>0.220<br>0.576<br>0.308<br>0.365<br>0.337<br>0.133<br>0.209<br>0.038   | 3<br>0.039<br>0.257<br>0.136<br>0.237<br>0.529<br>0.193<br>0.427<br>0.126<br>0.220<br>0.184<br>0.355<br>0.338<br>0.364<br>0.140<br>0.121<br>0.133<br>0.125<br>0.190   | 4<br>0.219<br>0.109<br>0.239<br>0.101<br>0.214<br>0.612<br>0.739<br>0.354<br>0.369<br>0.397<br>0.406<br>0.725<br>0.248<br>0.280<br>0.350<br>0.251<br>0.251  | 5<br>0.172<br>0.524<br>0.236<br>0.443<br>0.293<br>0.580<br>0.527<br>0.685<br>0.451<br>0.315<br>0.428<br>0.398<br>0.639<br>1.275<br>0.157<br>0.225<br>6.662<br>0.493   | 6<br>0.135<br>0.236<br>0.538<br>0.243<br>0.307<br>0.367<br>0.421<br>0.639<br>0.403<br>0.576<br>0.417<br>0.586<br>0.978<br>0.918<br>0.183<br>0.183<br>0.183  | 7<br>0.043<br>0.264<br>0.525<br>0.681<br>0.338<br>0.570<br>0.545<br>0.594<br>0.610<br>0.462<br>0.493<br>0.370<br>0.537<br>0.887<br>0.782<br>0.470<br>0.145  | 8<br>0.163<br>0.277<br>0.127<br>0.625<br>0.355<br>0.392<br>0.544<br>0.616<br>0.527<br>0.366<br>0.439<br>0.759<br>1.084<br>0.736<br>0.565<br>0.180   | 9<br>0.045<br>1.028<br>0.021<br>0.819<br>0.238<br>0.669<br>0.727<br>0.615<br>0.711<br>0.760<br>0.498<br>0.668<br>0.477<br>0.757<br>0.750<br>0.926<br>0.494<br>0.604   | 0.106<br>0.252<br>0.490<br>0.440<br>0.318<br>0.450<br>0.533<br>0.678<br>0.622<br>0.475<br>0.545<br>0.416<br>0.539<br>0.838<br>0.830<br>0.435<br>0.413   | 0.002<br>0.002<br>0.139<br>2.943<br>0.090<br>0.248<br>0.383<br>0.960<br>1.402<br>0.958<br>0.579<br>0.383<br>0.540<br>0.324<br>0.639<br>0.776<br>0.129<br>0.077   |
| Fishing N<br>1965.00<br>1966.00<br>1967.00<br>1968.00<br>1970.00<br>1971.00<br>1973.00<br>1975.00<br>1976.00<br>1977.00<br>1978.00<br>1978.00<br>1978.00  | 40rtalit;<br>1 0.089<br>0.064<br>0.140<br>0.152<br>0.071<br>0.405<br>0.013<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.0000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.0000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.0000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.0000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.0000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.0000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.0000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.0000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.0000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.0000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.0000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.0000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.0000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.0000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.0   | 2<br>0.370<br>0.480<br>0.386<br>0.917<br>0.433<br>0.636<br>0.434<br>0.126<br>0.220<br>0.576<br>0.308<br>0.365<br>0.337<br>0.133<br>0.209<br>0.038   | 3<br>0.039<br>0.257<br>0.136<br>0.237<br>0.529<br>0.193<br>0.427<br>0.126<br>0.220<br>0.184<br>0.355<br>0.338<br>0.364<br>0.140<br>0.121<br>0.133<br>0.125<br>0.190   | 4<br>0.219<br>0.109<br>0.239<br>0.101<br>0.214<br>0.612<br>0.739<br>0.354<br>0.369<br>0.397<br>0.406<br>0.725<br>0.248<br>0.280<br>0.350<br>0.251<br>0.251  | 5<br>0.172<br>0.524<br>0.236<br>0.443<br>0.293<br>0.580<br>0.527<br>0.685<br>0.451<br>0.315<br>0.426<br>0.639<br>1.275<br>0.157<br>0.225<br>0.662<br>0.493  | 0.135<br>0.236<br>0.538<br>0.243<br>0.307<br>0.367<br>0.449<br>0.821<br>0.639<br>0.403<br>0.576<br>0.417<br>0.586<br>0.978<br>0.918<br>0.183<br>0.451   | 7<br>0.043<br>0.264<br>0.525<br>0.681<br>0.338<br>0.570<br>0.545<br>0.594<br>0.610<br>0.462<br>0.493<br>0.370<br>0.537<br>0.887<br>0.782<br>0.470<br>0.145  | 8<br>0.163<br>0.277<br>0.127<br>0.625<br>0.355<br>0.392<br>0.544<br>0.616<br>0.527<br>0.366<br>0.439<br>0.756<br>1.084<br>0.736<br>0.565<br>0.180   | 9<br>0.045<br>1.028<br>0.021<br>0.819<br>0.238<br>0.669<br>0.727<br>0.615<br>0.711<br>0.760<br>4.98<br>0.477<br>0.757<br>0.755<br>0.926<br>0.494<br>0.604<br>0.222  | 0.106<br>0.252<br>0.490<br>0.440<br>0.318<br>0.450<br>0.533<br>0.678<br>0.622<br>0.475<br>0.545<br>0.416<br>0.539<br>0.838<br>0.830<br>0.435<br>0.413   | 0.002<br>0.002<br>0.139<br>2.943<br>0.090<br>0.248<br>0.960<br>1.402<br>0.958<br>0.579<br>0.383<br>0.540<br>0.324<br>0.639<br>0.776<br>0.129<br>0.077  |
| Fishing b<br>1965.00<br>1966.00<br>1966.00<br>1968.00<br>1970.00<br>1971.00<br>1973.00<br>1974.00<br>1977.00<br>1977.00<br>1977.00<br>1978.00<br>1981.00<br>1981.00   | 10.089<br>0.064<br>0.140<br>0.152<br>0.071<br>0.405<br>0.013<br>0.000<br>0.000<br>0.013<br>0.014<br>0.000<br>0.029<br>0.001<br>0.002<br>0.002  | 2<br>0.370<br>0.480<br>0.386<br>0.917<br>0.433<br>0.636<br>0.434<br>0.126<br>0.220<br>0.576<br>0.308<br>0.365<br>0.337<br>0.133<br>0.209<br>0.036<br>0.092<br>0.036<br>0.092  | 3<br>0.039<br>0.257<br>0.136<br>0.237<br>0.529<br>0.193<br>0.427<br>0.126<br>0.220<br>0.184<br>0.355<br>0.364<br>0.140<br>0.121<br>0.133<br>0.215<br>0.190  | 4<br>0.219<br>0.109<br>0.239<br>0.101<br>0.214<br>0.612<br>0.446<br>0.739<br>0.354<br>0.369<br>0.377<br>0.406<br>0.725<br>0.248<br>0.280<br>0.350<br>0.251  | 5<br>0.172<br>0.524<br>0.236<br>0.443<br>0.293<br>0.580<br>0.527<br>0.685<br>0.451<br>0.315<br>0.426<br>0.639<br>1.275<br>0.157<br>0.225<br>0.662<br>0.493  | 6<br>0.135<br>0.236<br>0.538<br>0.243<br>0.307<br>0.367<br>0.449<br>0.821<br>0.639<br>0.403<br>0.576<br>0.417<br>0.586<br>0.978<br>0.918<br>0.183<br>0.451<br>0.767<br>0.468  | 7<br>0.043<br>0.264<br>0.525<br>0.681<br>0.338<br>0.570<br>0.545<br>0.610<br>0.462<br>0.493<br>0.370<br>0.537<br>0.782<br>0.470<br>0.145<br>0.370   | 8<br>0.163<br>0.277<br>0.127<br>0.625<br>0.355<br>0.392<br>0.544<br>0.616<br>0.527<br>0.366<br>0.439<br>0.756<br>1.084<br>0.736<br>0.565<br>0.180   | 9<br>0.045<br>1.028<br>0.021<br>0.819<br>0.238<br>0.669<br>0.727<br>0.615<br>0.711<br>0.760<br>0.498<br>0.668<br>0.477<br>0.757<br>0.750<br>0.926<br>0.494<br>0.604   | 0.106<br>0.252<br>0.490<br>0.440<br>0.318<br>0.450<br>0.533<br>0.678<br>0.622<br>0.475<br>0.545<br>0.416<br>0.539<br>0.838<br>0.830<br>0.435<br>0.413   | 0.002<br>0.002<br>0.139<br>2.943<br>0.090<br>0.248<br>0.383<br>0.960<br>1.402<br>0.958<br>0.579<br>0.383<br>0.540<br>0.324<br>0.639<br>0.776<br>0.129<br>0.077   |
| Fishing b<br>1965.00<br>1966.00<br>1967.00<br>1968.00<br>1970.00<br>1971.00<br>1972.00<br>1973.00<br>1974.00<br>1975.00<br>1978.00<br>1978.00<br>1978.00<br>1978.00<br>1981.00<br>1981.00<br>1983.00<br>1984.00   | 10.089<br>0.064<br>0.140<br>0.152<br>0.071<br>0.405<br>0.013<br>0.000<br>0.013<br>0.014<br>0.000<br>0.029<br>0.001<br>0.002<br>0.002<br>0.002<br>0.002   | 2<br>0.370<br>0.480<br>0.386<br>0.917<br>0.433<br>0.636<br>0.434<br>0.126<br>0.220<br>0.576<br>0.308<br>0.365<br>0.337<br>0.133<br>0.209<br>0.086<br>0.092<br>0.086<br>0.119  | 3<br>0.039<br>0.257<br>0.136<br>0.237<br>0.529<br>0.193<br>0.427<br>0.126<br>0.220<br>0.184<br>0.355<br>0.338<br>0.364<br>0.140<br>0.121<br>0.133<br>0.215<br>0.176<br>0.218  | 4<br>0.219<br>0.109<br>0.239<br>0.101<br>0.214<br>0.612<br>0.354<br>0.369<br>0.357<br>0.406<br>0.725<br>0.248<br>0.280<br>0.350<br>0.251<br>0.251   | 5<br>0.172<br>0.524<br>0.236<br>0.443<br>0.293<br>0.580<br>0.527<br>0.685<br>0.451<br>0.315<br>0.451<br>0.398<br>0.639<br>1.275<br>0.157<br>0.225<br>0.662<br>0.493<br>0.220  | 6<br>0.135<br>0.236<br>0.538<br>0.243<br>0.307<br>0.367<br>0.449<br>0.639<br>0.403<br>0.576<br>0.417<br>0.586<br>0.978<br>0.183<br>0.451<br>0.767<br>0.468  | 7<br>0.043<br>0.264<br>0.525<br>0.681<br>0.338<br>0.570<br>0.545<br>0.610<br>0.462<br>0.493<br>0.370<br>0.537<br>0.782<br>0.470<br>0.145<br>0.370<br>0.145  | 8<br>0.163<br>0.277<br>0.127<br>0.625<br>0.355<br>0.392<br>0.544<br>0.616<br>0.527<br>0.366<br>0.439<br>0.759<br>1.084<br>0.756<br>0.756<br>0.765<br>0.765  | 9<br>0.045<br>1.028<br>0.021<br>0.819<br>0.238<br>0.669<br>0.727<br>0.615<br>0.711<br>0.760<br>0.498<br>0.668<br>0.477<br>0.757<br>0.755<br>0.926<br>0.494<br>0.604<br>0.604  | 0.106<br>0.252<br>0.490<br>0.440<br>0.318<br>0.450<br>0.533<br>0.678<br>0.622<br>0.475<br>0.545<br>0.416<br>0.539<br>0.838<br>0.435<br>0.435<br>0.435   | 0.002<br>0.002<br>0.139<br>2.943<br>0.090<br>0.248<br>0.383<br>0.960<br>1.402<br>0.958<br>0.579<br>0.383<br>0.540<br>0.324<br>0.639<br>0.129<br>0.129<br>0.129   |
| Fishing b<br>1965.00<br>1966.00<br>1966.00<br>1968.00<br>1970.00<br>1971.00<br>1972.00<br>1973.00<br>1974.00<br>1975.00<br>1977.00<br>1978.00<br>1979.00<br>1980.00<br>1982.00<br>1983.00<br>1983.00<br>1984.00<br>1983.00                                  | 10.089 0.064 0.140 0.152 0.071 0.405 0.013 0.000 0.000 0.013 0.014 0.000 0.005 0.001 0.002 0.001 0.002 0.001 0.002   | 2<br>0.370<br>0.480<br>0.386<br>0.917<br>0.433<br>0.636<br>0.434<br>0.126<br>0.220<br>0.576<br>0.308<br>0.365<br>0.337<br>0.133<br>0.209<br>0.038<br>0.092<br>0.086<br>0.119<br>0.030<br>0.030  | 3<br>0.039<br>0.257<br>0.136<br>0.237<br>0.529<br>0.193<br>0.427<br>0.126<br>0.220<br>0.184<br>0.355<br>0.338<br>0.364<br>0.140<br>0.121<br>0.133<br>0.215<br>0.176<br>0.218  | 4<br>0.219<br>0.109<br>0.239<br>0.101<br>0.214<br>0.612<br>0.739<br>0.354<br>0.350<br>0.248<br>0.280<br>0.251<br>0.140<br>0.529<br>0.428<br>0.459   | 5<br>0.172<br>0.524<br>0.236<br>0.443<br>0.293<br>0.580<br>0.527<br>0.685<br>0.451<br>0.315<br>0.428<br>0.398<br>0.639<br>1.275<br>0.157<br>0.255<br>0.403<br>0.220<br>0.710<br>0.560   | 0.135<br>0.236<br>0.233<br>0.243<br>0.307<br>0.367<br>0.421<br>0.639<br>0.403<br>0.576<br>0.417<br>0.586<br>0.978<br>0.918<br>0.183<br>0.451<br>0.767<br>0.468<br>0.327   | 7<br>0.043<br>0.264<br>0.525<br>0.681<br>0.338<br>0.570<br>0.545<br>0.594<br>0.610<br>0.462<br>0.493<br>0.370<br>0.537<br>0.782<br>0.470<br>0.145<br>0.370<br>0.913<br>0.302<br>0.346             | 8<br>0.163<br>0.277<br>0.127<br>0.625<br>0.355<br>0.392<br>0.544<br>0.616<br>0.527<br>0.366<br>0.370<br>0.436<br>0.759<br>1.084<br>0.736<br>0.565<br>0.180<br>0.487<br>0.487  | 9<br>0.045<br>1.028<br>0.021<br>0.819<br>0.238<br>0.669<br>0.727<br>0.615<br>0.711<br>0.760<br>0.498<br>0.668<br>0.477<br>0.757<br>0.755<br>0.926<br>0.494<br>0.604<br>0.222<br>1.1627  | 0.106<br>0.252<br>0.490<br>0.440<br>0.318<br>0.450<br>0.533<br>0.678<br>0.622<br>0.475<br>0.416<br>0.539<br>0.838<br>0.830<br>0.435<br>0.413<br>0.708<br>0.655  | 0.002<br>0.002<br>0.139<br>2.943<br>0.090<br>0.248<br>0.383<br>0.960<br>1.402<br>0.958<br>0.579<br>6.383<br>0.540<br>0.324<br>0.639<br>0.776<br>0.129<br>0.077   |
| Fishing b<br>1965.00<br>1966.00<br>1967.00<br>1968.00<br>1970.00<br>1971.00<br>1972.00<br>1973.00<br>1974.00<br>1975.00<br>1978.00<br>1978.00<br>1978.00<br>1978.00<br>1981.00<br>1981.00<br>1983.00<br>1984.00   | 10.089<br>0.064<br>0.140<br>0.152<br>0.071<br>0.405<br>0.013<br>0.000<br>0.013<br>0.014<br>0.000<br>0.029<br>0.001<br>0.002<br>0.002<br>0.002<br>0.002   | 2<br>0.370<br>0.480<br>0.386<br>0.917<br>0.433<br>0.636<br>0.434<br>0.126<br>0.220<br>0.576<br>0.308<br>0.365<br>0.337<br>0.133<br>0.209<br>0.038<br>0.092<br>0.086<br>0.119<br>0.030<br>0.030  | 3<br>0.039<br>0.257<br>0.136<br>0.237<br>0.529<br>0.193<br>0.427<br>0.126<br>0.220<br>0.184<br>0.355<br>0.338<br>0.364<br>0.140<br>0.121<br>0.133<br>0.215<br>0.176<br>0.218  | 4<br>0.219<br>0.109<br>0.239<br>0.101<br>0.214<br>0.612<br>0.739<br>0.354<br>0.350<br>0.248<br>0.280<br>0.251<br>0.140<br>0.529<br>0.428<br>0.459   | 5<br>0.172<br>0.524<br>0.236<br>0.443<br>0.293<br>0.580<br>0.527<br>0.685<br>0.451<br>0.315<br>0.451<br>0.398<br>0.639<br>1.275<br>0.157<br>0.225<br>0.662<br>0.493<br>0.220  | 6<br>0.135<br>0.236<br>0.538<br>0.243<br>0.307<br>0.367<br>0.449<br>0.639<br>0.403<br>0.576<br>0.417<br>0.586<br>0.978<br>0.183<br>0.451<br>0.767<br>0.468  | 7<br>0.043<br>0.264<br>0.525<br>0.681<br>0.338<br>0.570<br>0.545<br>0.610<br>0.462<br>0.493<br>0.370<br>0.537<br>0.782<br>0.470<br>0.145<br>0.370<br>0.145  | 8<br>0.163<br>0.277<br>0.625<br>0.355<br>0.392<br>0.544<br>0.616<br>0.527<br>0.366<br>0.439<br>0.755<br>1.084<br>0.736<br>0.565<br>0.487<br>0.852<br>0.448<br>0.169   | 9<br>0.045<br>1.026<br>0.021<br>0.819<br>0.238<br>0.669<br>0.727<br>0.615<br>0.711<br>0.760<br>0.498<br>0.668<br>0.477<br>0.757<br>0.750<br>0.926<br>0.494<br>0.604<br>0.222<br>1.195<br>0.604  | 0.106<br>0.252<br>0.490<br>0.440<br>0.318<br>0.450<br>0.533<br>0.678<br>0.622<br>0.475<br>0.545<br>0.416<br>0.539<br>0.830<br>0.435<br>0.435<br>0.413<br>0.708<br>0.655<br>0.465  | 0.002<br>0.002<br>0.139<br>2.943<br>0.090<br>0.248<br>0.383<br>0.960<br>1.402<br>0.579<br>6.383<br>0.540<br>0.639<br>0.776<br>0.129<br>0.077<br>0.124<br>3.753<br>0.168<br>0.095   |
| Fishing b<br>1965.00<br>1966.00<br>1966.00<br>1969.00<br>1970.00<br>1971.00<br>1973.00<br>1974.00<br>1975.00<br>1977.00<br>1978.00<br>1979.00<br>1981.00<br>1982.00<br>1983.00<br>1984.00<br>1984.00  | 10.089<br>0.064<br>0.140<br>0.152<br>0.071<br>0.405<br>0.013<br>0.000<br>0.000<br>0.013<br>0.014<br>0.000<br>0.029<br>0.001<br>0.002<br>0.000<br>0.002<br>0.000<br>0.002<br>0.000<br>0.002<br>0.000<br>0.000<br>0.000<br>0.000   | 2<br>0.370<br>0.480<br>0.386<br>0.917<br>0.433<br>0.636<br>0.434<br>0.126<br>0.220<br>0.576<br>0.308<br>0.365<br>0.337<br>0.133<br>0.209<br>0.036<br>0.092<br>0.086<br>0.119<br>0.030<br>0.060<br>0.091   | 3<br>0.039<br>0.257<br>0.136<br>0.237<br>0.529<br>0.193<br>0.427<br>0.126<br>0.220<br>0.184<br>0.355<br>0.338<br>0.364<br>0.140<br>0.121<br>0.133<br>0.215<br>0.176<br>0.218<br>0.176   | 4<br>0.219<br>0.109<br>0.239<br>0.101<br>0.214<br>0.612<br>0.446<br>0.739<br>0.354<br>0.369<br>0.357<br>0.406<br>0.725<br>0.248<br>0.350<br>0.251<br>0.140<br>0.529<br>0.428<br>0.428<br>0.428<br>0.428   | 5<br>0.172<br>0.524<br>0.236<br>0.443<br>0.293<br>0.580<br>0.527<br>0.685<br>0.451<br>0.315<br>0.428<br>0.398<br>0.639<br>1.275<br>0.157<br>0.225<br>0.463<br>0.220<br>0.710<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.510<br>0.51 | 6<br>0.135<br>0.236<br>0.538<br>0.243<br>0.307<br>0.469<br>0.821<br>0.639<br>0.403<br>0.576<br>0.417<br>0.586<br>0.918<br>0.183<br>0.451<br>0.767<br>0.468<br>0.327<br>0.459<br>0.459   | 7<br>0.043<br>0.264<br>0.525<br>0.681<br>0.338<br>0.570<br>0.594<br>0.610<br>0.462<br>0.493<br>0.370<br>0.537<br>0.867<br>0.782<br>0.470<br>0.145<br>0.370<br>0.913<br>0.302<br>0.913             | 8<br>0.163<br>0.277<br>0.127<br>0.625<br>0.355<br>0.392<br>0.544<br>0.616<br>0.527<br>0.366<br>0.370<br>0.436<br>0.759<br>1.084<br>0.736<br>0.565<br>0.180<br>0.487<br>0.487  | 9<br>0.045<br>1.026<br>0.021<br>0.819<br>0.238<br>0.669<br>0.727<br>0.615<br>0.711<br>0.760<br>0.498<br>0.668<br>0.477<br>0.757<br>0.750<br>0.926<br>0.494<br>0.604<br>0.222<br>1.195<br>0.604  | 0.106<br>0.252<br>0.490<br>0.440<br>0.318<br>0.450<br>0.533<br>0.678<br>0.622<br>0.475<br>0.545<br>0.416<br>0.539<br>0.830<br>0.435<br>0.435<br>0.413<br>0.708<br>0.655<br>0.465  | 0.002<br>0.002<br>0.139<br>2.943<br>0.090<br>0.248<br>0.383<br>0.960<br>1.402<br>0.958<br>0.579<br>6.383<br>0.540<br>0.324<br>0.639<br>0.776<br>0.129<br>0.077   |
| Fishing b<br>1965.00<br>1966.00<br>1966.00<br>1968.00<br>1970.00<br>1971.00<br>1971.00<br>1973.00<br>1974.00<br>1977.00<br>1977.00<br>1978.00<br>1978.00<br>1981.00<br>1981.00<br>1981.00<br>1983.00<br>1984.00<br>1985.00<br>1985.00<br>1985.00<br>1987.00 | 10.089<br>0.064<br>0.140<br>0.152<br>0.071<br>0.405<br>0.013<br>0.000<br>0.000<br>0.013<br>0.014<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.0000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.000<br>0.00 | 2<br>0.370<br>0.480<br>0.386<br>0.917<br>0.433<br>0.636<br>0.434<br>0.126<br>0.220<br>0.576<br>0.308<br>0.365<br>0.337<br>0.133<br>0.209<br>0.036<br>0.092<br>0.086<br>0.119<br>0.030<br>0.060  | 3<br>0.039<br>0.257<br>0.136<br>0.237<br>0.529<br>0.193<br>0.427<br>0.126<br>0.220<br>0.184<br>0.355<br>0.364<br>0.140<br>0.121<br>0.133<br>0.215<br>0.215<br>0.218<br>0.151  | 4<br>0.219<br>0.109<br>0.239<br>0.101<br>0.214<br>0.612<br>0.446<br>0.739<br>0.354<br>0.369<br>0.350<br>0.251<br>0.248<br>0.280<br>0.251<br>0.140<br>0.529<br>0.428<br>0.459<br>0.428   | 5<br>0.172<br>0.524<br>0.236<br>0.443<br>0.293<br>0.580<br>0.527<br>0.685<br>0.451<br>0.315<br>0.426<br>0.639<br>1.275<br>0.157<br>0.225<br>0.662<br>0.710<br>0.560<br>0.710  | 6<br>0.135<br>0.236<br>0.538<br>0.243<br>0.307<br>0.367<br>0.449<br>0.821<br>0.639<br>0.476<br>0.978<br>0.978<br>0.918<br>0.183<br>0.451<br>0.767<br>0.468<br>0.327<br>0.459<br>0.220<br>0.166  | 7<br>0.043<br>0.264<br>0.525<br>0.681<br>0.338<br>0.570<br>0.545<br>0.610<br>0.462<br>0.493<br>0.370<br>0.537<br>0.782<br>0.470<br>0.145<br>0.370<br>0.913<br>0.302<br>0.346<br>0.200<br>0.205    | 8<br>0.163<br>0.277<br>0.127<br>0.625<br>0.355<br>0.392<br>0.544<br>0.616<br>0.527<br>0.366<br>0.439<br>0.759<br>1.084<br>0.736<br>0.565<br>0.180<br>0.487<br>0.852<br>0.448<br>0.169   | 9<br>0.045<br>1.028<br>0.021<br>0.819<br>0.238<br>0.669<br>0.727<br>0.615<br>0.711<br>0.760<br>0.498<br>0.668<br>0.477<br>0.757<br>0.755<br>0.926<br>0.494<br>0.604<br>0.222<br>1.195<br>0.627<br>0.192   | 0.106<br>0.252<br>0.490<br>0.440<br>0.318<br>0.450<br>0.533<br>0.678<br>0.622<br>0.475<br>0.539<br>0.838<br>0.830<br>0.435<br>0.413<br>0.708<br>0.655<br>0.483<br>0.655   | 0.002<br>0.002<br>0.139<br>2.943<br>0.090<br>0.248<br>0.960<br>1.402<br>0.958<br>0.579<br>0.383<br>0.540<br>0.324<br>0.639<br>0.776<br>0.129<br>0.077<br>0.124<br>3.753<br>0.168<br>0.095  |
| Fishing N<br>1965.00<br>1966.00<br>1967.00<br>1968.00<br>1970.00<br>1971.00<br>1972.00<br>1973.00<br>1976.00<br>1976.00<br>1977.00<br>1978.00<br>1978.00<br>1980.00<br>1982.00<br>1983.00<br>1983.00<br>1985.00<br>1985.00                                  | 10.089 0.064 0.140 0.152 0.071 0.405 0.013 0.000 0.003 0.014 0.000 0.029 0.001 0.002 0.000 0.002 0.000 0.002 0.000 0.002 0.000 0.002   | 2<br>0.370<br>0.480<br>0.386<br>0.917<br>0.433<br>0.636<br>0.434<br>0.126<br>0.576<br>0.308<br>0.365<br>0.337<br>0.133<br>0.209<br>0.036<br>0.092<br>0.086<br>0.119<br>0.092<br>0.086<br>0.119<br>0.090   | 3<br>0.039<br>0.257<br>0.136<br>0.237<br>0.529<br>0.193<br>0.427<br>0.126<br>0.355<br>0.338<br>0.364<br>0.140<br>0.121<br>0.133<br>0.215<br>0.176<br>0.218  | 4<br>0.219<br>0.109<br>0.239<br>0.101<br>0.214<br>0.612<br>0.446<br>0.739<br>0.359<br>0.397<br>0.406<br>0.725<br>0.248<br>0.280<br>0.251<br>0.140<br>0.529<br>0.428<br>0.459<br>0.459   | 5<br>0.172<br>0.524<br>0.236<br>0.443<br>0.293<br>0.580<br>0.527<br>0.685<br>0.451<br>0.315<br>0.428<br>0.398<br>0.639<br>1.275<br>0.157<br>0.255<br>0.462<br>0.403<br>0.220<br>0.710<br>0.560<br>0.144   | 0.135<br>0.236<br>0.243<br>0.243<br>0.307<br>0.367<br>0.421<br>0.639<br>0.403<br>0.576<br>0.417<br>0.586<br>0.978<br>0.918<br>0.183<br>0.451<br>0.767<br>0.468<br>0.327<br>0.459<br>0.220<br>0.166<br>0.381   | 7 0.043 0.264 0.525 0.681 0.338 0.570 0.545 0.594 0.610 0.462 0.493 0.370 0.537 0.782 0.470 0.913 0.302 0.302 0.304 0.200 0.205 0.228   | 8<br>0.163<br>0.277<br>0.127<br>0.625<br>0.355<br>0.392<br>0.544<br>0.616<br>0.370<br>0.436<br>0.439<br>0.759<br>1.084<br>0.736<br>0.565<br>0.180<br>0.487<br>0.852<br>0.448<br>0.169<br>0.202<br>0.359   | 9<br>0.045<br>1.028<br>0.021<br>0.819<br>0.238<br>0.669<br>0.727<br>0.615<br>0.711<br>0.760<br>0.498<br>0.668<br>0.477<br>0.757<br>0.757<br>0.750<br>0.926<br>0.494<br>0.604<br>0.222<br>1.195<br>0.627<br>0.119  | 0.106<br>0.252<br>0.490<br>0.440<br>0.318<br>0.450<br>0.533<br>0.678<br>0.622<br>0.475<br>0.545<br>0.838<br>0.830<br>0.435<br>0.413<br>0.708<br>0.653<br>0.445<br>0.445<br>0.445  | 0.002<br>0.002<br>0.139<br>2.943<br>0.090<br>0.248<br>0.383<br>0.960<br>1.402<br>0.958<br>0.579<br>0.383<br>0.540<br>0.324<br>0.639<br>0.776<br>0.129<br>0.077<br>0.124<br>3.753<br>0.168<br>0.095   |
| Fishing b<br>1965.00<br>1966.00<br>1966.00<br>1968.00<br>1970.00<br>1971.00<br>1971.00<br>1973.00<br>1974.00<br>1977.00<br>1977.00<br>1978.00<br>1978.00<br>1981.00<br>1981.00<br>1981.00<br>1983.00<br>1984.00<br>1985.00<br>1985.00<br>1985.00<br>1987.00 | 10.089 0.064 0.140 0.152 0.071 0.405 0.013 0.000 0.003 0.014 0.000 0.029 0.001 0.002 0.000 0.002 0.000 0.002 0.000 0.002 0.000 0.002   | 2<br>0.370<br>0.480<br>0.386<br>0.917<br>0.433<br>0.636<br>0.434<br>0.126<br>0.576<br>0.308<br>0.365<br>0.337<br>0.133<br>0.209<br>0.036<br>0.092<br>0.086<br>0.119<br>0.092<br>0.086<br>0.119<br>0.090   | 3<br>0.039<br>0.257<br>0.136<br>0.237<br>0.529<br>0.193<br>0.427<br>0.126<br>0.355<br>0.338<br>0.364<br>0.140<br>0.121<br>0.133<br>0.215<br>0.176<br>0.218  | 4<br>0.219<br>0.109<br>0.239<br>0.101<br>0.214<br>0.612<br>0.446<br>0.739<br>0.369<br>0.397<br>0.406<br>0.280<br>0.251<br>0.140<br>0.529<br>0.428<br>0.459<br>0.459   | 5<br>0.172<br>0.524<br>0.236<br>0.443<br>0.293<br>0.580<br>0.527<br>0.685<br>0.451<br>0.315<br>0.428<br>0.398<br>0.639<br>1.275<br>0.157<br>0.255<br>0.462<br>0.403<br>0.220<br>0.710<br>0.560<br>0.144   | 6<br>0.135<br>0.236<br>0.538<br>0.243<br>0.307<br>0.367<br>0.449<br>0.821<br>0.639<br>0.476<br>0.978<br>0.978<br>0.918<br>0.183<br>0.451<br>0.767<br>0.468<br>0.327<br>0.459<br>0.220<br>0.166  | 7<br>0.043<br>0.264<br>0.525<br>0.681<br>0.338<br>0.570<br>0.545<br>0.610<br>0.462<br>0.493<br>0.370<br>0.537<br>0.782<br>0.470<br>0.145<br>0.370<br>0.913<br>0.302<br>0.346<br>0.200<br>0.205    | 8<br>0.163<br>0.277<br>0.127<br>0.625<br>0.355<br>0.392<br>0.544<br>0.616<br>0.527<br>0.366<br>0.439<br>0.756<br>0.436<br>0.736<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.48 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| Fishing N 1965.00 1966.00 1966.00 1968.00 1970.00 1971.00 1972.00 1973.00 1974.00 1977.00 1978.00 1978.00 1978.00 1988.00 1988.00 1988.00 1988.00   | 10.089 0.064 0.140 0.152 0.071 0.405 0.013 0.000 0.003 0.014 0.000 0.013 0.014 0.000 0.002 0.001 0.002 0.001 0.002 0.001 0.002 0.001 0.002 0.001 0.002 0.000 0.002 0.001 0.002 0.000 0.002   | 2 0.370<br>0.480<br>0.386<br>0.917<br>0.433<br>0.636<br>0.434<br>0.126<br>0.220<br>0.576<br>0.308<br>0.365<br>0.337<br>0.133<br>0.209<br>0.036<br>0.092<br>0.086<br>0.119<br>0.030<br>0.060<br>0.097  | 3<br>0.039<br>0.257<br>0.136<br>0.237<br>0.529<br>0.193<br>0.427<br>0.126<br>0.220<br>0.184<br>0.355<br>0.338<br>0.364<br>0.140<br>0.121<br>0.133<br>0.215<br>0.176<br>0.218<br>0.176   | 4<br>0.219<br>0.109<br>0.239<br>0.101<br>0.214<br>0.612<br>0.446<br>0.739<br>0.354<br>0.369<br>0.397<br>0.406<br>0.725<br>0.248<br>0.280<br>0.350<br>0.251<br>0.140<br>0.529<br>0.428<br>0.459<br>0.190<br>0.283<br>0.459<br>0.190<br>0.283<br>0.459<br>0.190   | 5<br>0.172<br>0.524<br>0.236<br>0.443<br>0.293<br>0.580<br>0.527<br>0.685<br>0.451<br>0.315<br>0.428<br>0.639<br>1.275<br>0.157<br>0.225<br>0.662<br>0.403<br>0.220<br>0.710<br>0.560<br>0.144<br>0.237<br>0.398<br>0.204   | 6<br>0.135<br>0.236<br>0.233<br>0.307<br>0.367<br>0.449<br>0.821<br>0.639<br>0.403<br>0.576<br>0.417<br>0.586<br>0.978<br>0.918<br>0.183<br>0.451<br>0.767<br>0.468<br>0.327<br>0.459<br>0.220<br>0.166<br>0.381<br>0.265   | 7 0.043 0.264 0.525 0.681 0.338 0.570 0.545 0.594 0.610 0.462 0.493 0.370 0.537 0.887 0.782 0.470 0.145 0.370 0.913 0.302 0.205 0.205 0.208   | 8<br>0.163<br>0.277<br>0.127<br>0.625<br>0.355<br>0.392<br>0.544<br>0.616<br>0.527<br>0.366<br>0.439<br>0.756<br>0.436<br>0.736<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.487<br>0.48 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0.106<br>0.252<br>0.490<br>0.440<br>0.318<br>0.450<br>0.533<br>0.678<br>0.622<br>0.475<br>0.545<br>0.416<br>0.539<br>0.830<br>0.435<br>0.435<br>0.408<br>0.435<br>0.408<br>0.435<br>0.408<br>0.435<br>0.408<br>0.435<br>0.408<br>0.435<br>0.408<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435 | 0.002<br>0.002<br>0.139<br>2.943<br>0.090<br>0.248<br>0.383<br>0.960<br>1.402<br>0.958<br>0.579<br>0.383<br>0.540<br>0.324<br>0.639<br>0.776<br>0.129<br>0.077<br>0.124<br>3.753<br>0.168<br>0.095   |
| Fishing b 1965.00 1966.00 1966.00 1968.00 1970.00 1971.00 1971.00 1977.00 1977.00 1977.00 1978.00 1978.00 1978.00 1988.00 1988.00 1988.00 1988.00 1988.00   | 10.089 0.064 0.140 0.152 0.071 0.405 0.013 0.000 0.000 0.013 0.014 0.000 0.020 0.001 0.002 0.001 0.002 0.000 0.002 0.000 0.002 0.000 0.002 0.000 0.002 0.000 0.002 0.000 0.002 0.000 0.002 0.000   | 2<br>0.370<br>0.480<br>0.386<br>0.917<br>0.433<br>0.636<br>0.434<br>0.126<br>0.220<br>0.576<br>0.308<br>0.365<br>0.337<br>0.133<br>0.209<br>0.036<br>0.092<br>0.086<br>0.119<br>0.030<br>0.060<br>0.097<br>0.111  | 3<br>0.039<br>0.257<br>0.136<br>0.237<br>0.529<br>0.193<br>0.427<br>0.126<br>0.220<br>0.184<br>0.355<br>0.338<br>0.364<br>0.140<br>0.121<br>0.133<br>0.215<br>0.176<br>0.218<br>0.176<br>0.218<br>0.171<br>0.134<br>0.218   | 4<br>0.219<br>0.109<br>0.239<br>0.101<br>0.214<br>0.612<br>0.446<br>0.739<br>0.354<br>0.369<br>0.397<br>0.406<br>0.725<br>0.248<br>0.350<br>0.251<br>0.140<br>0.529<br>0.428<br>0.428<br>0.459<br>0.140<br>0.529<br>0.428<br>0.428<br>0.428<br>0.428<br>0.428<br>0.428<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.45 | 5<br>0.172<br>0.524<br>0.236<br>0.443<br>0.293<br>0.580<br>0.451<br>0.315<br>0.428<br>0.398<br>0.639<br>1.275<br>0.157<br>0.225<br>0.403<br>0.220<br>0.710<br>0.560<br>0.144<br>0.237<br>0.398<br>0.204<br>0.421  | 6<br>0.135<br>0.236<br>0.538<br>0.243<br>0.307<br>0.449<br>0.821<br>0.639<br>0.403<br>0.576<br>0.417<br>0.586<br>0.978<br>0.183<br>0.451<br>0.767<br>0.468<br>0.327<br>0.468<br>0.327<br>0.468<br>0.327<br>0.468<br>0.381<br>0.265<br>0.381   | 7 0.043 0.264 0.525 0.681 0.338 0.570 0.545 0.594 0.610 0.462 0.493 0.370 0.537 0.782 0.470 0.145 0.370 0.913 0.302 0.346 0.200 0.205 0.228 0.204 0.581   | 8<br>0.163<br>0.277<br>0.127<br>0.625<br>0.355<br>0.392<br>0.541<br>0.616<br>0.527<br>0.366<br>0.439<br>0.756<br>0.736<br>0.736<br>0.487<br>0.882<br>0.488<br>0.169<br>0.202<br>0.359<br>0.202<br>0.359   | 9<br>0.045<br>1.028<br>0.021<br>0.819<br>0.238<br>0.669<br>0.727<br>0.615<br>0.711<br>0.760<br>0.498<br>0.668<br>0.477<br>0.757<br>0.757<br>0.926<br>0.494<br>0.604<br>0.222<br>1.195<br>0.627<br>0.119<br>0.192<br>0.171<br>0.192  | 0.106<br>0.252<br>0.490<br>0.440<br>0.318<br>0.450<br>0.533<br>0.678<br>0.622<br>0.475<br>0.416<br>0.539<br>0.830<br>0.435<br>0.435<br>0.435<br>0.435<br>0.435<br>0.413<br>0.708<br>0.655<br>0.483<br>0.708<br>0.655  | 0.002<br>0.002<br>0.139<br>2.943<br>6.090<br>0.248<br>0.960<br>1.402<br>0.958<br>0.579<br>0.383<br>0.540<br>0.639<br>0.776<br>0.129<br>0.077<br>0.124<br>3.753<br>0.166<br>0.095<br>0.087<br>0.163<br>0.160<br>0.300   |
| Fishing N 1965.00 1966.00 1967.00 1968.00 1970.00 1971.00 1972.00 1973.00 1976.00 1977.00 1978.00 1978.00 1978.00 1988.00 1988.00 1988.00 1988.00 1988.00 1989.00   | 10.089 0.064 0.140 0.152 0.071 0.405 0.013 0.000 0.003 0.014 0.000 0.002 0.001 0.002 0.001 0.002 0.001 0.002 0.001 0.002 0.001 0.002 0.001 0.002 0.001 0.002 0.001 0.002 0.001 0.002 0.001 0.002 0.001 0.002 0.001 0.002 0.001   | 2<br>0.370<br>0.480<br>0.386<br>0.917<br>0.433<br>0.636<br>0.434<br>0.126<br>0.576<br>0.308<br>0.365<br>0.337<br>0.133<br>0.209<br>0.036<br>0.092<br>0.086<br>0.119<br>0.030<br>0.060<br>0.097  | 3<br>0.039<br>0.257<br>0.136<br>0.237<br>0.529<br>0.193<br>0.427<br>0.126<br>0.355<br>0.368<br>0.364<br>0.121<br>0.121<br>0.121<br>0.176<br>0.218<br>0.176<br>0.218   | 4<br>0.219<br>0.109<br>0.239<br>0.101<br>0.214<br>0.612<br>0.446<br>0.739<br>0.359<br>0.397<br>0.406<br>0.280<br>0.280<br>0.251<br>0.140<br>0.529<br>0.428<br>0.459<br>0.190<br>0.283<br>0.315<br>0.177<br>0.415  | 5<br>0.172<br>0.524<br>0.236<br>0.443<br>0.293<br>0.580<br>0.527<br>0.685<br>0.451<br>0.315<br>0.428<br>0.639<br>1.275<br>0.157<br>0.157<br>0.255<br>0.403<br>0.220<br>0.710<br>0.560<br>0.144<br>0.237<br>0.398<br>0.237<br>0.398<br>0.241<br>0.237  | 0.135<br>0.236<br>0.538<br>0.243<br>0.307<br>0.4639<br>0.821<br>0.639<br>0.403<br>0.576<br>0.417<br>0.586<br>0.978<br>0.918<br>0.183<br>0.767<br>0.459<br>0.220<br>0.166<br>0.381<br>0.265<br>0.348   | 7 0.043 0.264 0.525 0.681 0.338 0.570 0.545 0.594 0.610 0.462 0.493 0.370 0.537 0.782 0.470 0.913 0.302 0.346 0.200 0.205 0.228 0.204 0.581 0.387   | 8<br>0.163<br>0.277<br>0.127<br>0.625<br>0.355<br>0.392<br>0.544<br>0.616<br>0.370<br>0.436<br>0.439<br>0.759<br>1.084<br>0.7565<br>0.180<br>0.487<br>0.852<br>0.448<br>0.169<br>0.202<br>0.359<br>0.145<br>0.202<br>0.359<br>0.486   | 9<br>0.045<br>1.028<br>0.021<br>0.819<br>0.238<br>0.669<br>0.727<br>0.615<br>0.710<br>0.498<br>0.668<br>0.477<br>0.757<br>0.757<br>0.750<br>0.926<br>0.494<br>0.604<br>0.222<br>1.195<br>0.627<br>0.119<br>0.171<br>0.231<br>0.395  | 0.106<br>0.252<br>0.490<br>0.440<br>0.318<br>0.450<br>0.533<br>0.678<br>0.622<br>0.475<br>0.545<br>0.416<br>0.539<br>0.830<br>0.435<br>0.413<br>0.708<br>0.655<br>0.413<br>0.708<br>0.655<br>0.445<br>0.201<br>0.201<br>0.232<br>0.344<br>0.232<br>0.344  | 0.002<br>0.002<br>0.139<br>2.943<br>0.090<br>0.248<br>0.383<br>0.960<br>1.402<br>0.958<br>0.579<br>0.383<br>0.540<br>0.324<br>0.639<br>0.777<br>0.129<br>0.077<br>0.124<br>3.753<br>0.168<br>0.095<br>0.087<br>0.163<br>0.160<br>0.300<br>0.630  |
| Fishing b 1965.00 1966.00 1966.00 1968.00 1970.00 1971.00 1971.00 1977.00 1977.00 1977.00 1978.00 1978.00 1978.00 1988.00 1988.00 1988.00 1988.00 1988.00   | 10.089 0.064 0.140 0.152 0.071 0.405 0.013 0.000 0.003 0.014 0.000 0.002 0.001 0.002 0.001 0.002 0.001 0.002 0.001 0.002 0.001 0.002 0.001 0.002 0.001 0.002 0.001 0.002 0.001 0.002 0.001 0.002 0.001 0.002 0.001 0.002 0.001   | 2<br>0.370<br>0.480<br>0.386<br>0.917<br>0.433<br>0.636<br>0.434<br>0.126<br>0.576<br>0.308<br>0.365<br>0.337<br>0.133<br>0.209<br>0.036<br>0.092<br>0.086<br>0.119<br>0.030<br>0.060<br>0.097  | 3<br>0.039<br>0.257<br>0.136<br>0.237<br>0.529<br>0.193<br>0.427<br>0.126<br>0.355<br>0.368<br>0.364<br>0.121<br>0.121<br>0.121<br>0.176<br>0.218<br>0.176<br>0.218   | 4<br>0.219<br>0.109<br>0.239<br>0.101<br>0.214<br>0.612<br>0.446<br>0.739<br>0.359<br>0.397<br>0.406<br>0.280<br>0.280<br>0.251<br>0.140<br>0.529<br>0.428<br>0.459<br>0.190<br>0.283<br>0.315<br>0.177<br>0.415  | 5<br>0.172<br>0.524<br>0.236<br>0.443<br>0.293<br>0.580<br>0.527<br>0.685<br>0.451<br>0.315<br>0.428<br>0.639<br>1.275<br>0.157<br>0.157<br>0.255<br>0.403<br>0.220<br>0.710<br>0.560<br>0.144<br>0.237<br>0.398<br>0.237<br>0.398<br>0.241<br>0.237  | 6<br>0.135<br>0.236<br>0.538<br>0.243<br>0.307<br>0.449<br>0.821<br>0.639<br>0.403<br>0.576<br>0.417<br>0.586<br>0.978<br>0.183<br>0.451<br>0.767<br>0.468<br>0.327<br>0.468<br>0.327<br>0.468<br>0.327<br>0.468<br>0.321<br>0.265<br>0.381<br>0.265<br>0.430   | 7 0.043 0.264 0.525 0.681 0.338 0.570 0.545 0.594 0.610 0.462 0.493 0.370 0.537 0.782 0.470 0.145 0.370 0.913 0.302 0.346 0.200 0.205 0.228 0.204 0.581   | 8<br>0.163<br>0.277<br>0.127<br>0.625<br>0.355<br>0.392<br>0.541<br>0.616<br>0.527<br>0.366<br>0.439<br>0.756<br>0.736<br>0.736<br>0.487<br>0.882<br>0.487<br>0.852<br>0.498<br>0.169<br>0.202<br>0.359<br>0.145<br>0.202   | 9<br>0.045<br>1.028<br>0.021<br>0.819<br>0.238<br>0.669<br>0.727<br>0.615<br>0.711<br>0.760<br>0.498<br>0.668<br>0.477<br>0.757<br>0.757<br>0.926<br>0.494<br>0.604<br>0.222<br>1.195<br>0.627<br>0.119<br>0.192<br>0.171<br>0.192  | 0.106<br>0.252<br>0.490<br>0.440<br>0.318<br>0.450<br>0.533<br>0.678<br>0.622<br>0.475<br>0.416<br>0.539<br>0.830<br>0.435<br>0.435<br>0.413<br>0.708<br>0.655<br>0.413<br>0.708<br>0.655<br>0.416<br>0.539   | 0.002<br>0.002<br>0.139<br>2.943<br>6.090<br>0.248<br>0.960<br>1.402<br>0.958<br>0.579<br>0.383<br>0.540<br>0.639<br>0.776<br>0.129<br>0.077<br>0.124<br>3.753<br>0.166<br>0.095<br>0.087<br>0.163<br>0.160<br>0.300   |
| Fishing b  1965.00 1966.00 1966.00 1968.00 1977.00 1973.00 1974.00 1975.00 1977.00 1978.00 1978.00 1978.00 1988.00 1988.00 1988.00 1988.00 1988.00 1988.00 1988.00 1989.00 1989.00  | 10.089 0.064 0.140 0.152 0.071 0.405 0.013 0.000 0.000 0.013 0.014 0.000   | 2 0.370<br>0.480<br>0.386<br>0.917<br>0.433<br>0.636<br>0.434<br>0.126<br>0.220<br>0.576<br>0.338<br>0.365<br>0.337<br>0.133<br>0.209<br>0.038<br>0.092<br>0.038<br>0.119<br>0.030<br>0.060<br>0.119<br>0.030<br>0.097<br>0.111<br>0.154<br>0.103   | 3<br>0.039<br>0.257<br>0.136<br>0.237<br>0.529<br>0.193<br>0.427<br>0.126<br>0.355<br>0.338<br>0.364<br>0.140<br>0.121<br>0.133<br>0.218<br>0.176<br>0.176<br>0.176<br>0.218<br>0.151<br>0.101<br>0.134<br>0.218  | 4<br>0.219<br>0.109<br>0.239<br>0.101<br>0.214<br>0.612<br>0.446<br>0.739<br>0.350<br>0.248<br>0.280<br>0.251<br>0.140<br>0.529<br>0.428<br>0.428<br>0.251<br>0.251<br>0.140<br>0.529<br>0.428<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.469<br>0.469<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.45 | 5<br>0.172<br>0.524<br>0.236<br>0.443<br>0.293<br>0.580<br>0.527<br>0.685<br>0.451<br>0.315<br>0.428<br>0.639<br>1.275<br>0.157<br>0.255<br>0.452<br>0.403<br>0.220<br>0.710<br>0.560<br>0.144<br>0.237<br>0.398<br>0.204<br>0.421<br>0.392<br>0.393  | 0.135<br>0.236<br>0.233<br>0.243<br>0.307<br>0.367<br>0.449<br>0.821<br>0.639<br>0.403<br>0.576<br>0.417<br>0.586<br>0.978<br>0.918<br>0.183<br>0.451<br>0.767<br>0.468<br>0.327<br>0.459<br>0.220<br>0.166<br>0.381<br>0.265<br>0.430<br>0.348<br>0.348  | 7 0.043 0.264 0.525 0.681 0.338 0.570 0.545 0.594 0.610 0.462 0.493 0.370 0.537 0.782 0.470 0.145 0.370 0.913 0.302 0.205 0.205 0.228 0.204 0.581 0.387 0.550                                     | 8<br>0.163<br>0.277<br>0.127<br>0.625<br>0.355<br>0.392<br>0.544<br>0.616<br>0.527<br>0.436<br>0.439<br>0.759<br>1.084<br>0.736<br>0.756<br>0.180<br>0.487<br>0.486<br>0.202<br>0.359<br>0.145<br>0.543<br>0.543<br>0.543   | 9<br>0.045<br>1.028<br>0.021<br>0.819<br>0.238<br>0.669<br>0.727<br>0.615<br>0.711<br>0.760<br>0.498<br>0.668<br>0.477<br>0.757<br>0.750<br>0.926<br>0.494<br>0.604<br>0.222<br>1.195<br>0.627<br>0.119<br>0.192<br>0.192<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.193<br>0.19 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4<br>0.219<br>0.109<br>0.239<br>0.101<br>0.214<br>0.612<br>0.446<br>0.739<br>0.354<br>0.357<br>0.406<br>0.725<br>0.248<br>0.350<br>0.251<br>0.140<br>0.529<br>0.428<br>0.458<br>0.428<br>0.459<br>0.283<br>0.315<br>0.214   | 5<br>0.172<br>0.524<br>0.236<br>0.443<br>0.293<br>0.580<br>0.527<br>0.685<br>0.451<br>0.315<br>0.428<br>0.398<br>0.639<br>1.275<br>0.157<br>0.225<br>0.403<br>0.220<br>0.710<br>0.560<br>0.144<br>0.237<br>0.398<br>0.204<br>0.421<br>0.392<br>0.421<br>0.392<br>0.597<br>0.686   | 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0.002<br>0.002<br>0.139<br>2.943<br>0.090<br>0.248<br>0.383<br>0.960<br>1.402<br>0.579<br>0.383<br>0.540<br>0.639<br>0.776<br>0.124<br>3.753<br>0.166<br>0.095<br>0.095<br>0.087<br>0.163<br>0.160<br>0.300<br>0.630<br>0.691<br>0.273   |
| Fishing b  1965.00 1966.00 1966.00 1968.00 1977.00 1973.00 1974.00 1975.00 1977.00 1978.00 1978.00 1978.00 1988.00 1988.00 1988.00 1988.00 1988.00 1988.00 1988.00 1989.00 1989.00  | 10.089 0.064 0.140 0.152 0.071 0.405 0.013 0.000 0.000 0.013 0.014 0.000 0.029 0.001 0.002 0.000 0.002 0.000 0.002 0.000 0.002 0.000 0.002 0.000 0.002 0.000 0.002 0.000 0.002 0.000 0.002 0.000   | 2<br>0.370<br>0.480<br>0.917<br>0.433<br>0.636<br>0.434<br>0.126<br>0.220<br>0.576<br>0.308<br>0.365<br>0.337<br>0.133<br>0.209<br>0.036<br>0.092<br>0.086<br>0.119<br>0.030<br>0.060<br>0.111<br>0.154<br>0.117<br>0.111   | 3<br>0.039<br>0.257<br>0.136<br>0.237<br>0.529<br>0.193<br>0.427<br>0.126<br>0.220<br>0.184<br>0.355<br>0.338<br>0.364<br>0.140<br>0.121<br>0.133<br>0.215<br>0.176<br>0.218<br>0.170<br>0.134<br>0.218<br>0.171<br>0.134<br>0.218  | 4<br>0.219<br>0.109<br>0.239<br>0.101<br>0.214<br>0.612<br>0.446<br>0.739<br>0.354<br>0.357<br>0.406<br>0.725<br>0.248<br>0.350<br>0.251<br>0.140<br>0.529<br>0.428<br>0.458<br>0.428<br>0.459<br>0.283<br>0.315<br>0.214   | 5<br>0.172<br>0.524<br>0.236<br>0.443<br>0.293<br>0.580<br>0.527<br>0.685<br>0.451<br>0.315<br>0.428<br>0.639<br>1.275<br>0.157<br>0.225<br>0.403<br>0.220<br>0.710<br>0.560<br>0.710<br>0.560<br>0.144<br>0.237<br>0.398<br>0.204<br>0.421<br>0.392<br>0.597<br>0.686<br>0.999   | 0.135<br>0.236<br>0.538<br>0.243<br>0.307<br>0.367<br>0.449<br>0.639<br>0.576<br>0.417<br>0.586<br>0.978<br>0.918<br>0.183<br>0.451<br>0.767<br>0.459<br>0.220<br>0.166<br>0.381<br>0.265<br>0.430<br>0.348<br>0.688<br>0.759<br>0.348<br>0.688<br>0.759  | 7 0.043 0.264 0.525 0.681 0.338 0.570 0.545 0.594 0.610 0.462 0.493 0.370 0.537 0.782 0.470 0.145 0.370 0.913 0.302 0.346 0.200 0.205 0.228 0.204 0.581 0.397 0.550 0.779 1.320                   | 8<br>0.163<br>0.277<br>0.127<br>0.625<br>0.355<br>0.392<br>0.544<br>0.616<br>0.370<br>0.436<br>0.439<br>0.759<br>1.084<br>0.756<br>0.180<br>0.487<br>0.852<br>0.448<br>0.169<br>0.202<br>0.359<br>0.145<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.544<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.544<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.544<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.54 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9<br>0.045<br>1.026<br>0.021<br>0.819<br>0.238<br>0.669<br>0.727<br>0.615<br>0.711<br>0.760<br>0.498<br>0.668<br>0.477<br>0.757<br>0.750<br>0.926<br>0.494<br>0.604<br>0.222<br>1.195<br>0.619<br>0.192<br>0.171<br>0.192<br>0.171<br>0.231<br>0.395<br>0.422<br>0.395  | 0.106<br>0.252<br>0.490<br>0.440<br>0.318<br>0.450<br>0.533<br>0.678<br>0.622<br>0.475<br>0.545<br>0.416<br>0.539<br>0.830<br>0.435<br>0.435<br>0.413<br>0.708<br>0.655<br>0.413<br>0.708<br>0.655<br>0.413<br>0.708<br>0.517<br>0.201<br>0.179<br>0.344<br>0.201<br>0.179<br>0.344<br>0.201<br>0.179   | 0.002<br>0.002<br>0.139<br>2.943<br>0.090<br>0.248<br>0.383<br>0.960<br>1.402<br>0.579<br>0.383<br>0.540<br>0.639<br>0.776<br>0.124<br>3.753<br>0.166<br>0.095<br>0.095<br>0.087<br>0.163<br>0.160<br>0.300<br>0.630<br>0.691<br>0.273   |
| Fishing N 1965.00 1966.00 1966.00 1968.00 1977.00 1973.00 1975.00 1977.00 1978.00 1978.00 1978.00 1978.00 1988.00 1988.00 1988.00 1988.00 1988.00 1988.00 1989.00 1991.00 1992.00 1993.00   | 10.089 0.064 0.140 0.152 0.071 0.405 0.013 0.000 0.000 0.013 0.014 0.000   | 2<br>0.370<br>0.480<br>0.386<br>0.917<br>0.433<br>0.636<br>0.434<br>0.126<br>0.220<br>0.576<br>0.308<br>0.365<br>0.337<br>0.133<br>0.209<br>0.038<br>0.092<br>0.086<br>0.119<br>0.030<br>0.092<br>0.086<br>0.119<br>0.030<br>0.040<br>0.092<br>0.086<br>0.119   | 3<br>0.039<br>0.257<br>0.136<br>0.237<br>0.529<br>0.193<br>0.427<br>0.126<br>0.338<br>0.355<br>0.338<br>0.364<br>0.121<br>0.133<br>0.215<br>0.190<br>0.176<br>0.215<br>0.191<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.101<br>0.10 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8<br>0.163<br>0.277<br>0.625<br>0.355<br>0.392<br>0.544<br>0.616<br>0.527<br>0.366<br>0.370<br>0.436<br>0.759<br>1.084<br>0.736<br>0.565<br>0.180<br>0.487<br>0.488<br>0.169<br>0.202<br>0.348<br>0.145<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.544<br>0.543<br>0.543<br>0.543<br>0.543<br>0.544<br>0.543<br>0.543<br>0.544<br>0.544<br>0.544<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.54 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0.002<br>0.002<br>0.139<br>2.943<br>0.090<br>0.248<br>0.383<br>0.960<br>1.402<br>0.958<br>0.579<br>0.383<br>0.540<br>0.324<br>0.639<br>0.776<br>0.129<br>0.077<br>0.124<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0.095<br>0. 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4<br>0.219<br>0.109<br>0.239<br>0.101<br>0.214<br>0.612<br>0.446<br>0.739<br>0.357<br>0.406<br>0.725<br>0.280<br>0.350<br>0.251<br>0.140<br>0.529<br>0.428<br>0.459<br>0.190<br>0.283<br>0.459<br>0.190<br>0.283<br>0.459<br>0.415<br>0.428<br>0.476<br>0.476<br>0.476<br>0.476<br>0.476  | 5<br>0.172<br>0.524<br>0.236<br>0.443<br>0.293<br>0.580<br>0.527<br>0.685<br>0.451<br>0.315<br>0.428<br>0.398<br>0.639<br>1.275<br>0.157<br>0.225<br>0.662<br>0.403<br>0.220<br>0.710<br>0.560<br>0.144<br>0.237<br>0.398<br>0.421<br>0.392<br>0.421<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.560<br>0.56 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8<br>0.163<br>0.277<br>0.127<br>0.625<br>0.355<br>0.392<br>0.544<br>0.527<br>0.366<br>0.439<br>0.759<br>1.084<br>0.736<br>0.487<br>0.487<br>0.487<br>0.489<br>0.202<br>0.359<br>0.145<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.543<br>0.544<br>0.543<br>0.544<br>0.543<br>0.544<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.545<br>0.54 | 9<br>0.045<br>1.028<br>0.021<br>0.819<br>0.238<br>0.669<br>0.727<br>0.615<br>0.711<br>0.760<br>0.498<br>0.477<br>0.757<br>0.750<br>0.926<br>0.494<br>0.604<br>0.222<br>1.195<br>0.192<br>0.192<br>0.171<br>0.231<br>0.395<br>0.425<br>0.477<br>0.757  | 0.106 0.252 0.490 0.440 0.318 0.450 0.533 0.678 0.622 0.475 0.416 0.539 0.838 0.830 0.435 0.413 0.708 0.655 0.413 0.708 0.655 0.421 0.179 0.344 0.232 0.517 0.421 0.663 0.773 1.126 1.098 0.822   | 0.002 0.002 0.1039 2.943 0.090 0.248 0.960 1.402 0.958 0.579 0.383 0.540 0.639 0.776 0.124 3.753 0.168 0.095 0.087 0.163 0.160 0.300 0.630 0.630 0.630 0.631 0.273 0.440 0.142   |
| Fishing N 1965.00 1966.00 1967.00 1968.00 1970.00 1971.00 1972.00 1973.00 1975.00 1975.00 1978.00 1978.00 1978.00 1978.00 1988.00 1988.00 1988.00 1988.00 1989.00 1999.00 1999.00 1999.00 1999.00 1999.00 1999.00   | 10.089 0.064 0.140 0.152 0.071 0.405 0.013 0.000 0.003 0.014 0.000 0.002 0.001 0.002 0.001 0.002 0.000   | 2 0.370<br>0.480<br>0.386<br>0.917<br>0.433<br>0.636<br>0.434<br>0.126<br>0.220<br>0.576<br>0.308<br>0.365<br>0.337<br>0.133<br>0.209<br>0.036<br>0.092<br>0.086<br>0.119<br>0.030<br>0.060<br>0.097<br>0.111<br>0.154<br>0.103<br>0.148<br>0.117<br>0.492<br>0.133<br>0.087  | 3<br>0.039<br>0.257<br>0.136<br>0.237<br>0.529<br>0.193<br>0.427<br>0.126<br>0.220<br>0.184<br>0.140<br>0.121<br>0.133<br>0.215<br>0.176<br>0.218<br>0.176<br>0.218<br>0.151<br>0.101<br>0.134<br>0.215<br>0.218<br>0.215<br>0.218  | 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8<br>0.163<br>0.277<br>0.625<br>0.355<br>0.392<br>0.543<br>0.616<br>0.527<br>0.366<br>0.439<br>0.755<br>0.180<br>0.736<br>0.487<br>0.852<br>0.488<br>0.169<br>0.202<br>0.359<br>0.416<br>0.523<br>0.486<br>0.539<br>0.496<br>0.539<br>0.496<br>0.539<br>0.496<br>0.539<br>0.496<br>0.539  | 9<br>0.045<br>1.026<br>0.021<br>0.819<br>0.238<br>0.669<br>0.727<br>0.615<br>0.711<br>0.760<br>0.498<br>0.668<br>0.477<br>0.757<br>0.757<br>0.926<br>0.604<br>0.222<br>1.195<br>0.627<br>0.119<br>0.192<br>0.171<br>0.395<br>0.422<br>0.395<br>0.422<br>0.959<br>0.959  | 0.106<br>0.252<br>0.490<br>0.440<br>0.318<br>0.450<br>0.533<br>0.678<br>0.622<br>0.475<br>0.545<br>0.416<br>0.539<br>0.830<br>0.435<br>0.435<br>0.435<br>0.435<br>0.455<br>0.465<br>0.201<br>0.179<br>0.344<br>0.201<br>0.179<br>0.344<br>0.201<br>0.179<br>0.342<br>0.517<br>0.421<br>0.663<br>0.773<br>0.773<br>0.673   | 0.002 0.002 0.139 2.943 0.090 0.248 0.383 0.960 1.402 0.958 0.579 0.383 0.540 0.324 0.639 0.776 0.129 0.077 0.124 3.753 0.168 0.095 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2<br>0.370<br>0.480<br>0.917<br>0.433<br>0.636<br>0.434<br>0.126<br>0.220<br>0.576<br>0.338<br>0.365<br>0.337<br>0.133<br>0.209<br>0.036<br>0.092<br>0.086<br>0.119<br>0.050<br>0.191<br>0.103<br>0.104<br>0.103<br>0.104<br>0.117<br>0.103<br>0.148<br>0.117<br>0.103<br>0.148<br>0.117<br>0.103<br>0.148<br>0.117<br>0.103<br>0.148<br>0.117<br>0.103<br>0.148<br>0.117<br>0.103<br>0.148<br>0.117<br>0.103<br>0.148<br>0.117<br>0.103<br>0.148<br>0.117<br>0.103<br>0.148<br>0.117<br>0.103<br>0.148<br>0.117<br>0.103<br>0.148<br>0.117<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.103<br>0.10 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3<br>0.039<br>0.257<br>0.126<br>0.237<br>0.529<br>0.193<br>0.427<br>0.126<br>0.355<br>0.338<br>0.364<br>0.121<br>0.133<br>0.215<br>0.170<br>0.176<br>0.218<br>0.151<br>0.101<br>0.101<br>0.134<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.218<br>0.228<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.238<br>0.23 | 4<br>0.219<br>0.109<br>0.239<br>0.101<br>0.214<br>0.612<br>0.446<br>0.739<br>0.359<br>0.397<br>0.406<br>0.228<br>0.280<br>0.251<br>0.140<br>0.529<br>0.459<br>0.459<br>0.190<br>0.283<br>0.459<br>0.190<br>0.283<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.459<br>0.45 | 5<br>0.172<br>0.524<br>0.443<br>0.293<br>0.580<br>0.527<br>0.685<br>0.451<br>0.315<br>0.428<br>0.398<br>0.639<br>1.275<br>0.157<br>0.255<br>0.462<br>0.403<br>0.220<br>0.710<br>0.560<br>0.144<br>0.237<br>0.398<br>0.204<br>0.597<br>0.685<br>0.999<br>0.709<br>0.659<br>0.659<br>0.659  | 6<br>0.135<br>0.236<br>0.538<br>0.243<br>0.307<br>0.449<br>0.821<br>0.639<br>0.403<br>0.576<br>0.417<br>0.586<br>0.978<br>0.183<br>0.451<br>0.767<br>0.468<br>0.327<br>0.459<br>0.220<br>0.166<br>0.381<br>0.265<br>0.348<br>0.688<br>0.759<br>1.089<br>1.089<br>1.089  | 7 0.043 0.264 0.525 0.681 0.338 0.570 0.545 0.594 0.610 0.462 0.493 0.370 0.537 0.887 0.782 0.470 0.913 0.302 0.205 0.205 0.204 0.581 0.397 0.550 0.279 1.320 1.320 1.320 1.320                   | 8<br>0.163<br>0.277<br>0.625<br>0.355<br>0.392<br>0.543<br>0.616<br>0.527<br>0.366<br>0.439<br>0.755<br>0.180<br>0.736<br>0.487<br>0.852<br>0.488<br>0.169<br>0.202<br>0.359<br>0.416<br>0.523<br>0.486<br>0.539<br>0.496<br>0.539<br>0.496<br>0.539<br>0.496<br>0.539<br>0.496<br>0.539  | 9<br>0.045<br>1.026<br>0.021<br>0.819<br>0.238<br>0.669<br>0.727<br>0.615<br>0.711<br>0.760<br>0.498<br>0.668<br>0.477<br>0.757<br>0.757<br>0.926<br>0.604<br>0.222<br>1.195<br>0.627<br>0.119<br>0.192<br>0.171<br>0.395<br>0.422<br>0.395<br>0.422<br>0.959<br>0.959  | 0.106<br>0.252<br>0.490<br>0.440<br>0.318<br>0.450<br>0.533<br>0.678<br>0.622<br>0.475<br>0.545<br>0.416<br>0.539<br>0.830<br>0.435<br>0.435<br>0.435<br>0.435<br>0.455<br>0.465<br>0.201<br>0.179<br>0.344<br>0.201<br>0.179<br>0.344<br>0.201<br>0.179<br>0.342<br>0.517<br>0.421<br>0.663<br>0.773<br>0.773<br>0.673   | 0.002 0.002 0.139 2.943 0.090 0.248 0.383 0.960 1.402 0.958 0.579 0.383 0.540 0.324 0.639 0.129 0.177 0.124 3.753 0.168 0.095 0.087 0.163 0.160 0.300 0.630 0.630 0.630 0.691 0.273 0.440 0.142 0.082 0.056  |

| 2000.00  | 0.001   | 0.338  | 0.306   | 0.614  | 1.138   | 1.358  | 2.328   | 2.468 | 3.009 | 1.646 | 0.003 |
|--|---|--|---|--|---|--|---|-------|-------|-------|-------|
|  |   |  |   |  |   |  | 2.203   |       |       |       |       |
|  |   | 0.360  |   |  |   |  |   |       | 1.920 | 1.920 | 0.001 |
|  |   |  |   |  |   |  | 2.905   | 2.289 | 2.858 | 0.000 | 0.000 |
| 2004.00  | 0.006   | 0.386  | 0.557   | 1.152  | 2.300   | 1.672  | 3.475   | 4.393 | 2.269 | 2.121 | 0.000 |
|  | 0.000   | 0.183  | 0.366   | 0.641  | 0.825   | 0.916  | 0.916   | 0.916 | 0.916 | 0.916 | 0.000 |
|  |   |  |   |  |   |  |   |       |       |       |       |
| German Onl   | y Acoust  | tic  |   |  |   |  |   |       |       |       |       |
| Age : 4<br>Ln calibra  | * i - n - n - n - n   |  | 1   | 39399  |   |  |   |       |       |       |       |
| Ln callbra   | cion con  | nstant :   |   | . 36363  |   |  |   |       |       |       |       |
| Year   | Obs   | served   | Predic  | cted   | Residua   | 1  | Ln Pop.   |       |       |       |       |
|  |   |  |   |  |   | -  |   |       |       |       |       |
| 1999.65  | 12  | .96753   | 13.7  | 6760   | -0.8000   | 7  | 12.44432  |       |       |       |       |
| 2000.65  | 13  | .16991   | 13.2  | 5648   | -0.0865   |  | 11.93319  |       |       |       |       |
| 2001.65  |   | .13023   | 13.0  |  | -0.9515   |  | 11.75851  |       |       |       |       |
| 2002.65  |   | .13044   |   | 0949   | 0.7209  |  | 12.08621  |       |       |       |       |
| 2003.65  | 3.0   | .28892   | 4 5 79 -  | 1139   | 1.0504  |  | 11.78811  |       |       |       |       |
| 2004.65  | 13  | .78289<br>.68104   | 13.7  | 3241   | -0.1105   |  | 12.46832  |       |       |       |       |
| 2005.65  | 13  | .00104   | 13.1  | 2101   | -0.220  | , ,  | 12.40002  |       |       |       |       |
|  | Average   | squared  | residua   | 1:   | 0.4600  | 1  |   |       |       |       |       |
|  |   |  |   |  |   |  |   |       |       |       |       |
| German Onl   | y Acous   | tic  |   |  |   |  |   |       |       |       |       |
| Age: 5   |   |  |   | 24000  |   |  |   |       |       |       |       |
| Ln calibra   | tion co   | nstant :   | 2   | . 34060  |   |  |   |       |       |       |       |
| Year   | Ob  | served   | Predi   | cted   | Residua   | 1  | Ln Pop.   |       |       |       |       |
|  |   |  |   |  |   |  |   |       |       |       |       |
| 1999.65  |   | .93920   | 14.0  |  | -0.1554   |  | 11.75404  |       |       |       |       |
| 2000.65  | 13  | .51565   | 13.6  | 6584   | -0.1501   |  | 11.32524  |       |       |       |       |
| 2001.65  | 12  | .02610   | 13.3  | 0414   | -1.2780   |  | 10.96354  |       |       |       |       |
| 2002.65  |   |  | 12.5  |  | 0.229   |  | 10.42328  |       |       |       |       |
| 2003.65  |   | .11189   | 12.2  |  | 1.053   |  | 9.86090   |       |       |       |       |
| 2005.65  |   | .40416   |   | 5470   | -0.250  |  | 10.31411  |       |       |       |       |
|  |   |  |   |  |   |  |   |       |       |       |       |
|  | Average   | squared  | residua   | 1 :  | 0.458   | 51   |   |       |       |       |       |
| C 0-1  |   |  |   |  |   |  |   |       |       |       |       |
| German Onl   |   | 010  |   |  |   |  |   |       |       |       |       |
| Ane : 6  |   |  |   |  |   |  |   |       |       |       |       |
| Age : 6<br>Ln calibra  |   |  | 2   | .47171   |   |  |   |       |       |       |       |
|  |   |  | 2   | .47171   |   |  |   |       |       |       |       |
| Ln calibra<br>Year   | tion co   | nstant :<br>served   | Predi   | cted   | Residu  |  | Ln Pop.   |       |       |       |       |
| Ln calibra   | otion co  | nstant :<br>served   | Predi   | cted   |   |  |   |       |       |       |       |
| Ln calibra<br>Year<br>1999.65  | otion co  | nstant :<br>served<br>.40713   | Predi   | cted<br>1038   | 0.196   | 75   | 10.73867  |       |       |       |       |
| Year<br>1999.65<br>2000.65   | ob<br>0b<br>13  | served<br>.40713   | Prediction 13.2   | cted<br>1038<br>4776   | 0.196   | 75<br>37   |   |       |       |       |       |
| Year<br>1999.65<br>2000.65<br>2001.65  | 0b  | nstant :<br>served<br>.40713   | Predi-<br>13.2<br>12.8<br>12.4<br>12.0  | cted<br>1038<br>4776<br>8570<br>2043   | 0.196   | 75<br>37<br>92   | 10.73867<br>10.37605  |       |       |       |       |
| Year<br>1999.65<br>2000.65<br>2001.65<br>2002.65   | 0b<br><br>13<br>12<br>11  | served<br>.40713<br>.79640<br>.62979   | Predi-<br>13.2<br>12.8<br>12.4<br>12.0  | cted<br>1038<br>4776<br>8570<br>2043   | 0.196<br>-0.051<br>-0.855   | 75<br>37<br>92<br>83   | 10.73867<br>10.37605<br>10.01399<br>9.54872<br>8.74284  |       |       |       |       |
| Year<br>1999.65<br>2000.65<br>2001.65  | 0b<br><br>13<br>12<br>11<br>12  | served<br>.40713<br>.79640<br>.62979<br>.02526   | Predi-<br>13.2<br>12.8<br>12.4<br>12.0<br>11.2  | cted<br><br>1038<br>4776<br>8570<br>2043<br>1456<br>0765   | 0.196<br>-0.051<br>-0.855<br>0.004<br>-0.031<br>0.772   | 75<br>37<br>92<br>83<br>18   | 10.73867<br>10.37605<br>10.01399<br>9.54872<br>8.74284<br>8.23593   |       |       |       |       |
| Year<br>1999.65<br>2000.65<br>2001.65<br>2002.65<br>2003.65  | Ob  | served<br>.40713<br>.79640<br>.62979<br>.02526<br>.18338   | Predi-<br>13.2<br>12.8<br>12.4<br>12.0<br>11.2  | cted<br><br>1038<br>4776<br>8570<br>2043<br>1456<br>0765   | 0.196<br>-0.051<br>-0.855<br>0.004<br>-0.031  | 75<br>37<br>92<br>83<br>18   | 10.73867<br>10.37605<br>10.01399<br>9.54872<br>8.74284  |       |       |       |       |
| Year<br>1999.65<br>2000.65<br>2001.65<br>2002.65<br>2003.65<br>2004.65<br>2005.65  | Ob  | served<br>.40713<br>.79640<br>.62979<br>.02526<br>.18338<br>.48017<br>.74706   | 13.2<br>12.8<br>12.4<br>12.0<br>11.2<br>10.7  | cted<br>1038<br>4776<br>8570<br>2043<br>1456<br>0765<br>8252   | 0.196<br>-0.051<br>-0.855<br>0.004<br>-0.031<br>0.772<br>-0.035   | 75<br>37<br>92<br>83<br>18<br>53   | 10.73867<br>10.37605<br>10.01399<br>9.54872<br>8.74284<br>8.23593   |       |       |       |       |
| Year<br>1999.65<br>2000.65<br>2001.65<br>2002.65<br>2003.65<br>2004.65<br>2005.65  | Ob  | served<br>-40713<br>.79640<br>.62979<br>.02526<br>.18338<br>.48017   | 13.2<br>12.8<br>12.4<br>12.0<br>11.2<br>10.7  | cted<br>1038<br>4776<br>8570<br>2043<br>1456<br>0765<br>8252   | 0.196<br>-0.051<br>-0.855<br>0.004<br>-0.031<br>0.772   | 75<br>37<br>92<br>83<br>18<br>53   | 10.73867<br>10.37605<br>10.01399<br>9.54872<br>8.74284<br>8.23593   |       |       |       |       |
| Year<br>1999.65<br>2000.65<br>2001.65<br>2002.65<br>2003.65<br>2004.65<br>2005.65  | 0b<br>  | nstant :<br>served<br>.40713<br>.79640<br>.62979<br>.02526<br>.18338<br>.48017<br>.74706<br>squared  | 13.2<br>12.8<br>12.4<br>12.0<br>11.2<br>10.7  | cted<br>1038<br>4776<br>8570<br>2043<br>1456<br>0765<br>8252   | 0.196<br>-0.051<br>-0.855<br>0.004<br>-0.031<br>0.772<br>-0.035   | 75<br>37<br>92<br>83<br>18<br>53   | 10.73867<br>10.37605<br>10.01399<br>9.54872<br>8.74284<br>8.23593   |       |       |       |       |
| Year 1999.65 2000.65 2001.65 2002.65 2003.65 2004.65 2005.65  German Onl   | Ob<br>13<br>12<br>11<br>12<br>11<br>10<br>Average   | .40713<br>.79640<br>.62979<br>.02526<br>.18338<br>.48017<br>.74706<br>squared  | Predi-<br>13.2<br>12.8<br>12.4<br>12.0<br>11.2<br>10.7<br>10.7<br>residua   | cted<br>1038<br>4776<br>8570<br>2043<br>1456<br>0765<br>8252   | 0.196<br>-0.051<br>-0.855<br>0.004<br>-0.031<br>0.772<br>-0.035   | 75<br>37<br>92<br>83<br>18<br>53   | 10.73867<br>10.37605<br>10.01399<br>9.54872<br>8.74284<br>8.23593   |       |       |       |       |
| Year 1999.65 2000.65 2001.65 2002.65 2003.65 2004.65 2005.65   | Ob<br>13<br>12<br>11<br>12<br>11<br>10<br>Average   | .40713<br>.79640<br>.62979<br>.02526<br>.18338<br>.48017<br>.74706<br>squared  | Predi-<br>13.2<br>12.8<br>12.4<br>12.0<br>11.2<br>10.7<br>10.7<br>residua   | cted<br>1038<br>4776<br>8570<br>2043<br>1456<br>0765<br>8252   | 0.196<br>-0.051<br>-0.855<br>0.004<br>-0.031<br>0.772<br>-0.035   | 75<br>37<br>92<br>83<br>18<br>53   | 10.73867<br>10.37605<br>10.01399<br>9.54872<br>8.74284<br>8.23593   |       |       |       |       |
| Year 1999.65 2000.65 2001.65 2002.65 2003.65 2004.65 2005.65  German Onl   | Obbination co   | nstant :<br>served<br>.40713<br>.79640<br>.62979<br>.02526<br>.18338<br>.48017<br>.74706<br>squared<br>tic   | Predi-<br>13.2<br>12.8<br>12.4<br>12.0<br>11.2<br>10.7<br>10.7<br>residua   | cted<br>1038<br>4776<br>8570<br>2043<br>1456<br>0765<br>8252<br>1 :  | 0.196<br>-0.851<br>-0.855<br>0.004<br>-0.031<br>0.772<br>-0.035   | 75<br>75<br>79<br>92<br>83<br>18<br>53<br>147  | 10.73867<br>10.37605<br>10.01399<br>9.54872<br>8.74284<br>8.23593<br>8.31081  |       |       |       |       |
| Year 1999.65 2000.65 2001.65 2002.65 2003.65 2004.65 2005.65  German Onl   | Obtained the control of the control | .40713<br>.79640<br>.62979<br>.02526<br>.18338<br>.48017<br>.74706<br>squared  | Predi-<br>13.2<br>12.8<br>12.4<br>12.0<br>11.2<br>10.7<br>10.7<br>residua   | cted<br><br>1038<br>4776<br>8570<br>2043<br>1456<br>0765<br>8252<br>1 :  | 0.196<br>-0.051<br>-0.855<br>0.004<br>-0.031<br>0.772<br>-0.035   | 75<br>75<br>77<br>92<br>83<br>18<br>53<br>47   | 10.73867<br>10.37605<br>10.01399<br>9.54872<br>8.74284<br>8.23593   |       |       |       |       |
| Year 1999.65 2000.65 2001.65 2002.65 2003.65 2004.65 2005.65  German Onl   | Ob<br>13<br>12<br>11<br>12<br>11<br>11<br>10<br>Average<br>by Acous   | .40713<br>.79640<br>.62979<br>.02526<br>.16338<br>.48017<br>.74706<br>squared<br>tic<br>nstant :   | Predi-<br>13.2<br>12.8<br>12.4<br>12.0<br>11.2<br>10.7<br>10.7<br>residua   | cted<br><br>1038<br>4776<br>8570<br>2043<br>1456<br>0765<br>8252<br>1 :  | 0.196<br>-0.855<br>0.004<br>-0.031<br>0.772<br>-0.035   | 75<br>37<br>92<br>83<br>18<br>18<br>47   | 10.73867<br>10.37605<br>10.01399<br>9.54872<br>8.74284<br>8.23593<br>8.31081<br>Ln Pop.   |       |       |       |       |
| Year 1999.65 2000.65 2001.65 2002.65 2003.65 2004.65 2005.65  German Onl Age: 7 Ln calibra Year 1999.65 2000.65  | Ober 13 122 111 12 11 110 Average 12 Acoust ation co  | .40713<br>.79640<br>.62979<br>.02526<br>.16338<br>.48017<br>.74706<br>squared<br>tic<br>nstant :<br>served<br>.00333<br>.95667   | Predi-<br>13.2<br>12.8<br>12.4<br>12.0<br>11.2<br>10.7<br>10.7<br>residua<br>3<br>Predi-<br>12.4  | 1038<br>4776<br>8570<br>2043<br>1456<br>0765<br>8252<br>1 :<br>.43146<br>cted<br>-0375   | 0.196<br>-0.855<br>0.004<br>-0.031<br>0.772<br>-0.035<br>0.196<br>Residu<br>-0.400<br>-0.156  | 75<br>337<br>32<br>83<br>18<br>53<br>47<br>14  | 10.73867<br>10.37605<br>10.01399<br>9.54872<br>8.74284<br>8.23593<br>6.31081<br>Ln Pop.<br>8.97229<br>8.68139   |       |       |       |       |
| Year 1999.65 2000.65 2001.65 2002.65 2003.65 2004.65 2005.65  German Onl Age: 7 Ln calibra Year 1999.65 2000.65 2001.65  | Obtain Co   | .40713<br>.79640<br>.62979<br>.02526<br>.18338<br>.48017<br>.74706<br>squared<br>tic<br>nstant :<br>served<br>.00333<br>.95667<br>.03088   | Predi-<br>13.2<br>12.8<br>12.4<br>12.0<br>11.2<br>10.7<br>10.7<br>residua<br>3<br>Predi-<br>12.4<br>12.1  | cted<br>1038<br>4776<br>8570<br>2043<br>1456<br>0765<br>8252<br>1 :<br>.43146<br>cted<br><br>0375<br>1286<br>0036                | 0.196<br>-0.855<br>0.004<br>-0.031<br>0.772<br>-0.035<br>0.196<br>Residu  | 75<br>377<br>92<br>83<br>18<br>53<br>47<br>14  | 10.73867<br>10.37605<br>10.01399<br>9.54872<br>8.74284<br>8.23593<br>8.31081<br>In Pop.<br>8.97229<br>8.68139<br>8.26889                                  |       |       |       |       |
| Year 1999.65 2000.65 2001.65 2003.65 2004.65 2005.65  German Onl Age: 7 Ln calibra Year 1999.65 2000.65 2000.65  | Oberage ation co  | nstant:<br>served<br>.40713<br>.79640<br>.62979<br>.02526<br>.18338<br>.48017<br>.74706<br>squared<br>tic<br>nstant:<br>served<br>.00333<br>.95667<br>.03088<br>.41724           | Predi-<br>13.2<br>12.8<br>12.4<br>12.0<br>11.2<br>10.7<br>10.7<br>residua<br>3<br>Predi-<br>12.4<br>12.1<br>11.7                                | cted<br>1038<br>4776<br>8570<br>2043<br>1456<br>0765<br>8252<br>1 :<br>.43146<br>cted<br>0375<br>1286<br>0036<br>3756            | 0.196<br>-0.855<br>0.004<br>-0.031<br>0.772<br>-0.035<br>0.196<br>Residu<br>-0.400<br>-0.156<br>-0.669<br>0.579                             | 75<br>37<br>92<br>83<br>18<br>53<br>47<br>14   | 10.73867<br>10.37605<br>10.01399<br>9.54872<br>8.74284<br>8.23593<br>6.31081<br>Ln Pop.<br>8.97229<br>8.68139<br>7.40610                                  |       |       |       |       |
| Year 1999.65 2000.65 2001.65 2002.65 2003.65 2005.65  German Onl Age: 7 Ln calibra Year 1999.65 2000.65 2001.65 2001.65 2001.65 2001.65 2001.65 2003.65  | Oberage iy Acous ation co   | nstant : served .40713 .79640 .62979 .02526 .18338 .48017 .74706 squared tic nstant : served .00333 .95667 .03088 .41724 .50934  | Predi-<br>13.2<br>12.8<br>12.4<br>12.0<br>11.2<br>10.7<br>10.7<br>residua<br>3<br>Fredi-<br>12.4<br>12.1<br>11.7<br>10.3                        | 1038<br>4776<br>8570<br>2043<br>1456<br>0765<br>8252<br>1:<br>.43146<br>cted<br>-0375<br>1286<br>0036<br>3756<br>9935            | 0.196<br>-0.855<br>0.004<br>-0.031<br>0.772<br>-0.035<br>0.196<br>Residu<br>-0.400<br>-0.156<br>-0.669<br>0.579                             | 75<br>337<br>92<br>83<br>18<br>53<br>47<br>14<br>42<br>19<br>48<br>68<br>99                  | 10.73867<br>10.37605<br>10.01399<br>9.54872<br>8.74284<br>8.23593<br>8.31081<br>In Pop.<br>8.97229<br>8.68139<br>8.26889<br>7.40610<br>6.96789            |       |       |       |       |
| Year 1999.65 2000.65 2001.65 2002.65 2003.65 2004.65 2005.65  German Onl Age: 7 In calibra Year 1999.65 2000.65 2001.65 2002.65 2003.65 2004.65  | Observation co  |  | Predi-<br>13.2<br>12.8<br>12.4<br>12.0<br>11.2<br>10.7<br>10.7<br>residua<br>3<br>Predi-<br>12.4<br>12.1<br>11.7<br>10.8<br>10.8                | 1038<br>4776<br>8570<br>2043<br>1456<br>0765<br>8252<br>1:<br>.43146<br>cted<br><br>0375<br>1286<br>0036<br>3756<br>9935<br>3114 | 0.196<br>-0.855<br>0.004<br>-0.031<br>0.772<br>-0.035<br>0.196<br>Residu<br>-0.400<br>-0.156<br>-0.669<br>0.579<br>0.109                    | 75<br>337<br>32<br>83<br>18<br>55<br>347<br>14<br>47<br>19<br>48<br>68<br>68<br>89<br>99     | 10.73867<br>10.37605<br>10.01399<br>9.54872<br>8.74284<br>8.23593<br>6.31081<br>Ln Pop.<br>8.97229<br>8.98139<br>8.26889<br>7.40610<br>6.96789<br>5.79967 |       |       |       |       |
| Year 1999.65 2000.65 2001.65 2002.65 2003.65 2005.65  German Onl Age: 7 Ln calibra Year 1999.65 2000.65 2001.65 2001.65 2001.65 2001.65 2001.65 2003.65  | Observation co  | nstant : served .40713 .79640 .62979 .02526 .18338 .48017 .74706 squared tic nstant : served .00333 .95667 .03088 .41724 .50934  | Predi-<br>13.2<br>12.8<br>12.4<br>12.0<br>11.2<br>10.7<br>10.7<br>residua<br>3<br>Predi-<br>12.4<br>12.1<br>11.7<br>10.8<br>10.8                | 1038<br>4776<br>8570<br>2043<br>1456<br>0765<br>8252<br>1:<br>.43146<br>cted<br>-0375<br>1286<br>0036<br>3756<br>9935            | 0.196<br>-0.855<br>0.004<br>-0.031<br>0.772<br>-0.035<br>0.196<br>Residu<br>-0.400<br>-0.156<br>-0.669<br>0.579                             | 75<br>337<br>32<br>83<br>18<br>55<br>347<br>14<br>47<br>19<br>48<br>68<br>68<br>89<br>99     | 10.73867<br>10.37605<br>10.01399<br>9.54872<br>8.74284<br>8.23593<br>8.31081<br>In Pop.<br>8.97229<br>8.68139<br>8.26889<br>7.40610<br>6.96789            |       |       |       |       |
| Year 1999.65 2000.65 2001.65 2002.65 2003.65 2004.65 2005.65  German Onl Age: 7 In calibra Year 1999.65 2000.65 2001.65 2002.65 2003.65 2004.65  | Oberage Average Ly Acous Ation co   |  | Predi-<br>13.2<br>12.8<br>12.0<br>11.2<br>10.7<br>10.7<br>residua<br>3<br>Predi-<br>12.4<br>12.1<br>11.7<br>10.8<br>10.3<br>9.2<br>10.3         | 1038<br>4776<br>8570<br>2043<br>1456<br>0765<br>8252<br>1 :<br>.43146<br>cted<br>0375<br>1286<br>0036<br>9935<br>3114<br>3571    | 0.196<br>-0.855<br>0.004<br>-0.031<br>0.772<br>-0.035<br>0.196<br>Residu<br>-0.400<br>-0.156<br>-0.669<br>0.579<br>0.109                    | 75<br>37<br>92<br>83<br>18<br>53<br>47<br>14<br>14<br>42<br>19<br>48<br>68<br>99<br>99<br>72 | 10.73867<br>10.37605<br>10.01399<br>9.54872<br>8.74284<br>8.23593<br>6.31081<br>Ln Pop.<br>8.97229<br>8.98139<br>8.26889<br>7.40610<br>6.96789<br>5.79967 |       |       |       |       |
| Ln calibra Year 1999.65 2000.65 2001.65 2003.65 2004.65 2005.65  German Onl Age: 7 Ln calibra Year 1999.65 2000.65 2001.65 2001.65 2002.65 2003.65 2003.65   | ob  ob  13  12  11  11  10  Average  iy Acous  ation co  Ob  Average  Average   | .40713<br>.79640<br>.62979<br>.02526<br>.18338<br>.48017<br>.74706<br>squared<br>tic<br>nstant :<br>served<br>.00333<br>.95667<br>.03088<br>.41724<br>.50934<br>.51886<br>.58458 | Predi-<br>13.2<br>12.8<br>12.0<br>11.2<br>10.7<br>10.7<br>residua<br>3<br>Predi-<br>12.4<br>12.1<br>11.7<br>10.8<br>10.3<br>9.2<br>10.3         | 1038<br>4776<br>8570<br>2043<br>1456<br>0765<br>8252<br>1 :<br>.43146<br>cted<br>0375<br>1286<br>0036<br>9935<br>3114<br>3571    | 0.196<br>-0.855<br>0.004<br>-0.031<br>0.772<br>-0.035<br>0.196<br>Residu<br>-0.400<br>-0.156<br>-0.669<br>0.579<br>0.109<br>1.287<br>-0.751 | 75<br>37<br>92<br>83<br>18<br>53<br>47<br>14<br>14<br>42<br>19<br>48<br>68<br>99<br>99<br>72 | 10.73867<br>10.37605<br>10.01399<br>9.54872<br>8.74284<br>8.23593<br>6.31081<br>Ln Pop.<br>8.97229<br>8.98139<br>8.26889<br>7.40610<br>6.96789<br>5.79967 |       |       |       |       |
| The calibration of the calibrati | Average  Average  Average  Average  Average  Average  Average   | .40713<br>.79640<br>.62979<br>.02526<br>.18338<br>.48017<br>.74706<br>squared<br>tic<br>nstant :<br>served<br>.00333<br>.95667<br>.03088<br>.41724<br>.50934<br>.51886<br>.58458 | Predi-<br>13.2<br>12.8<br>12.0<br>11.2<br>10.7<br>10.7<br>residua<br>3<br>Predi-<br>12.4<br>12.1<br>11.7<br>10.8<br>10.3<br>9.2<br>10.3         | 1038<br>4776<br>8570<br>2043<br>1456<br>0765<br>8252<br>1 :<br>.43146<br>cted<br>0375<br>1286<br>0036<br>9935<br>3114<br>3571    | 0.196<br>-0.855<br>0.004<br>-0.031<br>0.772<br>-0.035<br>0.196<br>Residu<br>-0.400<br>-0.156<br>-0.669<br>0.579<br>0.109<br>1.287<br>-0.751 | 75<br>37<br>92<br>83<br>18<br>53<br>47<br>14<br>14<br>42<br>19<br>48<br>68<br>99<br>99<br>72 | 10.73867<br>10.37605<br>10.01399<br>9.54872<br>8.74284<br>8.23593<br>6.31081<br>Ln Pop.<br>8.97229<br>8.98139<br>8.26889<br>7.40610<br>6.96789<br>5.79967 |       |       |       |       |
| Ln calibra Year 1999.65 2000.65 2001.65 2003.65 2004.65 2005.65  German Onl Age: 7 Ln calibra Year 1999.65 2000.65 2001.65 2001.65 2002.65 2003.65 2003.65   | Average  12  13  Average  14  16  Average  17  Average  18  Average  19  Average  |  | Predi-<br>13.2<br>12.8<br>12.4<br>12.0<br>11.2<br>10.7<br>10.7<br>residua<br>3<br>Predi-<br>12.4<br>12.1<br>11.7<br>10.8<br>10.3<br>9.2<br>10.3 | 1038<br>4776<br>8570<br>2043<br>1456<br>0765<br>8252<br>1 :<br>.43146<br>cted<br>0375<br>1286<br>0036<br>9935<br>3114<br>3571    | 0.196<br>-0.855<br>0.004<br>-0.031<br>0.772<br>-0.035<br>0.196<br>Residu<br>-0.400<br>-0.156<br>-0.669<br>0.579<br>0.109<br>1.287<br>-0.751 | 75<br>37<br>92<br>83<br>18<br>53<br>47<br>14<br>14<br>42<br>19<br>48<br>68<br>99<br>99<br>72 | 10.73867<br>10.37605<br>10.01399<br>9.54872<br>8.74284<br>8.23593<br>6.31081<br>Ln Pop.<br>8.97229<br>8.98139<br>8.26889<br>7.40610<br>6.96789<br>5.79967 |       |       |       |       |

Appendix C. VPA formulation and model output with German Bank acoustic index (ages 4-8).

| Year   | Obs  | served                                       | Predi                            | cted                                      | Residu               | āl      | Ln Pop.   |       |       |       |           |
|--|--|--|----------------------------------|---|----------------------|---------|-----------|-------|-------|-------|-----------|
|  |  |  |                                  |   |                      |         |           |       |       |       |           |
| 1999.65  | 8  | . 62361                                      |                                  | 2215                                      | -0.998               |         | 6.07971   |       |       |       |           |
| 2000.65  | 10   | .17591                                       |                                  | 5969                                      | -0.183               |         | 6.81725   |       |       |       |           |
| 2001.65  | 9.   | .42545                                       | 9.1                              |   | 0.245                |         | 5.63779   |       |       |       |           |
| 2002.65  | 9  | .51488                                       | 8.2                              | 5575                                      | 1.259                |         | 4.71331   |       |       |       |           |
| 2003.65  | 7  | .44813                                       | 8.1                              | 7343                                      | -0.725               | 31      | 4.63099   |       |       |       |           |
| 2004.65  | 7  | .85774                                       | 6.4                              | 6469                                      | 1.393                |         | 2.92225   |       |       |       |           |
| 2005.€5  | 6.   | .39236                                       | 7.3                              | 8196                                      | -0.989               | 60      | 3.83952   |       |       |       |           |
|  | Average                                      | squared                                      | residua                          | 1 :                                       | 0.874                | 63      |           |       |       |       |           |
| German Onl<br>German Onl<br>German Onl<br>German Onl<br>German Onl<br>Autocorrel | y Acoust<br>y Acoust<br>y Acoust<br>y Acoust | tic 5 Ab<br>tic 6 Ab<br>tic 7 Ab<br>tic 8 Ab | oundance<br>oundance<br>oundance | Proporti<br>Proporti<br>Proporti          | onal<br>onal<br>onal |         |           |       |       |       |           |
| 1.00 ý0.<br>ý0.26 1.<br>ý0.26 0.   | 0.0 0.0                                      | 7 0.06                                       | 0.06 0                           | .06                                       |                      |         |           |       |       |       |           |
| 90.25 0.   |  |  |                                  |   |                      |         |           |       |       |       |           |
| 90.25 0.   | 06 0.0                                       | 6 0.06                                       | 1.00 0                           | .06                                       |                      |         |           |       |       |       |           |
| ý0.25 0.   | 0.0  | 6 0.06                                       | 0.06 1                           | .00                                       |                      |         |           |       |       |       |           |
| Projection   | remit  | a uning                                      | analutic                         | al bias                                   | adjusted             | roint e | stimates  |       |       |       |           |
| Projected  |  |  |                                  | 0. D. | aujuoces             | prant o | E Camer - |       |       |       |           |
|  | 1  | 2  | 3                                | 4   |                      | 6       | 7         | 8     | 9     | 10    | 11+       |
| 2006.00 1  | 000000                                       | 818609                                       | 322624                           | 347187                                    | 179860               | 19503   | 2543      | 623   | 29    | 1     | 2877      |
| 2007.00 1  | 1000000                                      | 818731                                       | 640345                           | 241118                                    | 242321               | 119938  | 12712     | 1658  | 406   | 19    | 1876      |
| Fishing Mc   | ortality                                     |  |                                  |   |                      |         |           |       |       |       |           |
| raniang m  | 1  | 2  | 3                                | 4   | 5                    | 6       |           | 8     | 9     | 1.0   | 11+       |
| 2006.00  | 0.000  | 0.046  | 0.091                            | 0.160                                     | 0.205                | 0.228   | 0.228     | 0.228 | 0.228 | 0.228 | 0.228     |
|  |  |  |                                  |   |                      |         |           |       |       |       |           |
| M  |  |  |                                  |   |                      |         | 7         |       | 9     | 10    | 11        |
|  | 1  | 2  | 3                                |   |                      |         |           | 0.20  | 0.20  | 0.20  | 0.20      |
| 2006.00  | 0.20   | 0.20   | 0.20                             | 0.20                                      | 0.20                 | 0.20    | 0.20      | 0.20  | 0.20  | 0.20  | 0.20      |
|  |  |  |                                  |   |                      |         |           |       |       |       |           |
| PR   |  |  |                                  |   |                      | ,       | 7         | - 0   | 9     | 10    | 11        |
|  | 1  | 2  |                                  |   |                      |         |           | 8     |       |       |           |
| 2006.00  | 0.00   | 0.20   | 0.40                             | 0.70                                      | 0.90                 | 1.00    | 1.00      | 1.00  | 1.00  | 1.00  | 1.00      |
|  |  |  |                                  |   |                      |         |           |       |       |       |           |
| Beg wt   | -  | 2  | 3                                | 4   | 5                    | 6       | 7         | 8     | 9     | 10    | 11        |
| 2006 00  | 0.00   | 0.02   |                                  |   |                      |         |           |       |       |       | 0.35      |
| 2006.00  | 0.02   | 0.02   | 0.05                             | 0.11                                      | 0.16                 |         |           | 0.28  | 0.31  |       | 0.35      |
| 2007.00  | 0.02   | 0.02   | 0.00                             |   |                      |         |           |       |       |       |           |
|  |  |  |                                  |   |                      |         |           |       |       |       |           |
| Projected  | Populat<br>1                                 |  | nass<br>3                        | 4   | 5                    | 6       | 7         | 8     | 9     | 10    | 11        |
| 1+ 2+  |  | + 4  | 4+                               |   |                      |         |           |       |       |       |           |
| 2006.00  | 19046  | 15845  | 17358                            | 38404                                     | 29290                | 4100    | 627       | 176   | 9     | 0     | 1019      |
| 125874 10  |  |  |                                  |   |                      |         | 21.20     | 455   | 100   | 7     | 665       |
| 2007.00<br>165092 1  |  |  |                                  | 26671                                     | 39462                | 25215   | 3132      | 469   | 126   | ,     | 663       |
|  |  |  |                                  |   |                      |         |           |       |       |       |           |
| Projected  | Catch N                                      | lumbers                                      |                                  |   |                      |         |           |       |       |       |           |
|  | 1  | 2  | 3                                | 4   | 5                    | 6       | 7<br>472  | 8     | 9     | 10    | 11<br>534 |
| 2006.00  | 0  | 33098  | 25527                            | 46542                                     | 30345                | 3618    | 472       | 116   | 5     | 0     | 534       |
| 2007.00  |  |  |                                  |   |                      |         |           |       |       |       |           |
|  |  |  |                                  |   |                      |         |           |       |       |       |           |
| Avg wt   |  |  |                                  |   |                      |         |           |       |       |       |           |
|  | 1  | 2  | 3                                | 4   | 5                    | 6       | 7         | 8     | 9     | 10    | 11        |

Projected Catch Biomass

1 2 3 4 5 6 7 8 9 10 2006.00 0.02 0.03 0.08 0.14 0.19 0.23 0.26 0.31 0.32 0.36

0.36

|  | 1                | 2                 | 3       | 4        | 5                | 6       | 7    | 8    | 9    | 10   | 11   |
|--|------------------|-------------------|---------|----------|------------------|---------|------|------|------|------|------|
| 1+ 2+<br>2006.00                         | 3+               | 4+<br>1150        |         | 6558     |                  | 841     | 125  | 35   | 2    | 0    | 195  |
| 16839 16<br>2007.00                      | 839 15           | 690 135           | 65      |          |                  |         |      |      |      |      |      |
| Input for                                | Analytic         | al risk a         | nalysis | of pr    | ojection         | results |      |      |      |      |      |
| М  | 1                | 2                 | 3       | 4        | 5                | 6       | 7    | 8    | 9    | 10   | 1.1  |
| 2006.00                                  | 0.20             |                   | 0.20    | 0.20     |                  | 0.20    | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 |
| PR                                       |                  |                   | -       |          | 5                | 6       | 7    | 8    | 9    | 10   | 11   |
| 2006.00                                  | 0.00             | 0.20              | 0.40    | 0.70     |                  | 1.00    |      | 1.00 | 1.00 | 1.00 | 1.00 |
| Beg wt                                   |                  |                   |         |          |                  |         |      |      |      |      |      |
|  | 1                | 2                 | 3       | 4        |                  | 6       | 7 25 | 0.28 | 0.31 | 0.35 | 0.35 |
| 2006.00                                  | 0.02             | 0.02              | 0.05    | 0.11     |                  | 0.21    | 0.25 | 0.28 | 0.31 | 0.35 | 0.35 |
| Avg wt                                   |                  |                   |         |          |                  |         |      |      |      |      |      |
| 2006.00                                  | 0.02             | 0.03              | 0.08    | 0.14     |                  | 0.23    | 0.26 | 0.31 | 0.32 | 0.36 | 0.36 |
| Maturity                                 |                  |                   |         |          |                  |         |      |      |      |      |      |
|  | 1                | 2                 | 3       | 4        | 5                | 6       | 7    | - 8  | 9    | 10   | 1.1  |
| 2006.00                                  | 0.00             | 0.00              | 0.50    | 0.90     |                  | 1.00    | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
|  |                  | ploitatio         |         |          |                  |         |      |      |      |      |      |
| Quota<br>10000                           | 9.661            | td. Err.<br>3.764 | 0.7     |          | . Mean<br>8.908  | 0.175   |      |      |      |      |      |
| 20000                                    | 4.912            | 1.914             | 0.3     |          | 4.529            | 0.674   |      |      |      |      |      |
| 30000                                    | 3.334            | 1.299             | 0.2     | 60       | 3.074            | 0.963   |      |      |      |      |      |
| 40000                                    | 2.549            | 0.993             | 0.1     |          | 2.351            | 0.999   |      |      |      |      |      |
| 50000                                    | 2.083            | 0.811             | 0.1     |          | 1.920            | 1.000   |      |      |      |      |      |
| 70000                                    | 1.775            | 0.692             | 0.1     |          | 1.438            | 1.000   |      |      |      |      |      |
| 80000                                    | 1.402            | 0.546             | 0.1     |          | 1.293            | 1.000   |      |      |      |      |      |
| 90000                                    | 1.285            | 0.500             | 0.1     |          | 1.185            | 1.000   |      |      |      |      |      |
| 100000                                   | 1.196            | 0.466             | 0.0     | 93       | 1.103            | 1.000   |      |      |      |      |      |
| 110000                                   | 1.129            | 0.440             | 0.0     | 88       | 1.041            | 1.000   |      |      |      |      |      |
| % Biomass Change<br>Quota Mean Std. Err. |                  |                   |         |          |                  | Prob    |      |      |      |      |      |
| 10000                                    | 48               | 5                 |         | 1        | 47               | 0.000   |      |      |      |      |      |
| 20000                                    | 36               | -0                |         | 0        | 36               | 0.000   |      |      |      |      |      |
| 30000                                    | 25               | 4 9               |         | ý1<br>02 | 26<br>15         | 0.000   |      |      |      |      |      |
| 40000<br>50000                           | 13               | 13                |         | 92<br>93 | 4                | 0.373   |      |      |      |      |      |
| 60000                                    | ý10              | 17                |         | ý3       | 96               | 0.647   |      |      |      |      |      |
| 70000                                    | ÿ21              | 21                |         | ý4       | ý17              | 0.789   |      |      |      |      |      |
| 80000                                    | ý32              | 25                |         | ý4       | ý28              | 0.865   |      |      |      |      |      |
| 90000                                    | 943              | 29                |         | ý4       | ý39              | 0.909   |      |      |      |      |      |
| 100000<br>110000                         | ý54<br>ý65       | 32<br>35          |         | 94<br>91 | ý50<br>ý64       | 0.940   |      |      |      |      |      |
| Outob                                    |                  | mass (Ref         |         |          |                  | Devok   |      |      |      |      |      |
| Quota<br>10000                           | Mean S<br>126120 | 44804             |         |          | . Mean<br>117781 | 0.346   |      |      |      |      |      |
| 20000                                    | 116155           | 44783             |         |          | 107810           | 0.431   |      |      |      |      |      |
| 30000                                    | 106232           | 44745             |         | 56       | 97876            | 0.519   |      |      |      |      |      |
| 40000                                    | 96359            | 44682             | 83      | 78       | 87981            | 0.606   |      |      |      |      |      |
| 50000                                    | 86545            | 44587             |         | 17       | 78128            | 0.688   |      |      |      |      |      |
| 60000                                    | 76800            | 44446             |         | 87       | 68313            | 0.762   |      |      |      |      |      |
| 70000                                    | 67140            | 44239             |         | 11       | 58528            | 0.826   |      |      |      |      |      |
| 80000                                    | 57584<br>48161   | 43933             |         | 43<br>98 | 48741<br>38863   | 0.878   |      |      |      |      |      |
| 90000                                    | 38915            | 43470             | 102     |          | 28633            | 0.953   |      |      |      |      |      |
| 110000                                   | 29911            | 41501             | 127     |          | 17193            | 0.977   |      |      |      |      |      |
|  |                  |                   | 100     |          |                  |         |      |      |      |      |      |